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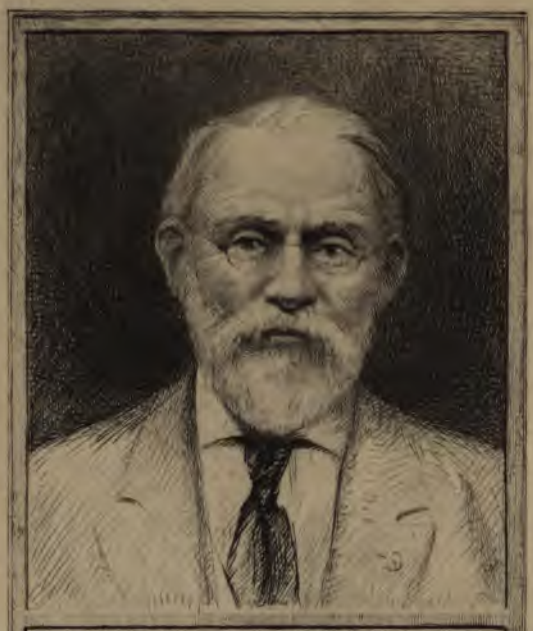

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TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY,

FROM JANUARY 1847 TO MAY 1849.

EDITED BY THE SECRETARY.

VOLUME VIII.

BOMBAY:

PRINTED AT THE TIMES' PRESS.

BY JAMES CHESSON.

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ERRATA.

Page 2, line	12	For *vertical* read *vortical*.
„	„	For *distruction* read *destruction*.
4	26	For *chancelled* read *channelled*.
7	35	For *true-westerly* read *line-westerly*.
8	11	For *Gosgets* read *Gasgets*.
11	26	For *Lat.* 11 *S.* read *Lat.* 11 *N.*
12	15	For 27·70 read 29·70.
„	25	For *halt* read *bolt*.
14	6	For *their* read *these*.
24	16	For *cannot be* read *cannot now be*.
29	22	For *month* read *months*.
„	41	For *at* the Northern read *in* &c.
34	19	For *on ordinary* read *on the ordinary*.
„	34	For *of* low sandy read *of the* low &c.
„	„	The word "*is*" to be omitted.
69	1	of remarks.—For cleared up, read *clewed* up.
100	3	For 28·80 read 28·08.

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MEETINGS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

A MEETING of this Society took place in their rooms, Town Hall, on Thursday the 4th February 1847—the Hon'ble J. P. Willoughby, Esq., Vice-President in in the chair. Present—the Hon'ble L. R. Reid, Esq.; Dr J. Bird, member of the Medical Board; Colonel N. Campbell, Quarter-Master General; C. J. Erskine, Esq., C. S., Private Secretary to the Hon'ble the Governor; Dr J. Glen, member of the Medical Board; Major J. Holland, Deputy Quarter-Master General; Dr J. Scott, Secretary Medical Board; Ali Mahomed Khan, Esq.; and Dr G. Buist, Secretary.

The minutes of last General Meeting having been read, the following donations and letters were laid before the Society:—

PAPER.—By Government.—Extract paras. 2 at 6 of a letter from the officer commanding the steam vessel *Victoria*, with a letter from Lieut. Colonel P. M. Melvill, Secretary to Government, dated Bombay Castle, 28th September, No. 1421 of 1846, Marine Department.

BOOKS.—By the Royal Society of Northern Antiquaries at Copenhagen, through the Bombay Branch of the Royal Asiatic Society.—2 copies of Memoires de la Societe Royale des Antiquaires du Nord, for 1840-43; Memoirs sur la decouverte de l' Amerique, audixieme siecle, par C. C. Rafu, for 1843; Antiquarisk tidsserift udgivet af det Kongelige Nordiske Oldskrift, Selskab, for 1843; 2 copies Nemoires de la Societe Royale des Antiquaires du Nord, for 1844; 1 copy of the Annual Report for 1834; 3 copies of the General Anniversary Meetings which took place on the 29th January 1838, 31st January, 1839, 31st January 1840; 5 copies of the Liste de ses Membres Fondateurs for 1845; 4 copies of the Asiatic Section; 1 copy of the works lately published on America; 1 copy of the works recently published by the Society on Critical Opinions; 1 copy of Extrait des Statuts Constitutifs; and 1 paper of Sanct Thomae Tidende, 11th Juni, 1845;—with two letters dated Copenhague, le 19th Novembre, 1845.

By the Author, through Capt. H. B. Lynch, I. N.—Documents sur l' Histoire, la Geographie, et le Commerce de la Partie Occidentale de Madagascar, recueillis et rediges par M. Guillain, Capitaine de Corvette—Paris, Imprimerie Royale, 1846.

By the Royal Geographical Society of London, through John Connon, Esq., per Madden & Co.—The Journal of the Royal Geographical Society of London, vol. 15th, part 2nd of 1845.

By the Author, through Mr H. G. Cannon, *Bookseller*.—A Statement of Facts relative to the Transactions between the writer and the late British Political Mission to the Court of Shoa, in Abyssinia. By C. T. Deke, Esq., P. H. D., F. S. A., F. R. G. S., &c. &c.; with a letter dated 6 St. Mildrea's, London, 29th September 1846.

MAPS.—By Commander J. A. Young, I. N.—Map of the Colony of New South Wales, exhibiting the situation and extent of the appropriated lands, including the Counties, Towns, Village reserves, &c.; compiled from authentic surveys &c., respectfully dedicated to Sir John Barrow, Bart., President of the Royal Geographical Society &c. &c. &c., by his obliged humble servant, Robert Dixon, Esq.—Map of Moreton Bay, part of Darling Downs, and Clarence districts, shewing the stations occupied by the squatters, N. S. Wales, compiled from the most recent surveys, and published by Robert Dixon, surveyor, in 1843.—Map of Darling Downs and part of Moreton Bay, shewing the stations occupied by the squatters.—Map of New England, Port Macquarie and Clarence districts, New South Wales, exhibiting the stations occupied by the squatters.—Map of Gipps' Land, shewing the stations occupied by the squatters.—And chart of Port Albert, from an accurate survey by T. S. Townsend, Esq, Surveyor General's Department; with a letter from the donor, dated Bombay, 5th October 1846.

LETTERS.—From Lieut. J. F. Jones, I. N., acknowledging the receipt of the Book of Regulations, and thanking the Society for his election as a member.

From R. K. Pringle, Esq., Chief Secretary to Government, dated 23rd November, No. 3699 of 1846—forwarding 5 printed copies of a despatch from the Hon. the Court of Directors to the Government of India [No. 6,] dated 3rd June, 1846, and intimating that Government would be happy to receive from the Society any information that may be likely to promote the object which the Hon'ble Court have in view in forming a Statistical Department in their Home Establishment.

"FINANCIAL DEPARTMENT. (STATISTICAL.) NO. 6 of 1846.

"OUR GOVERNOR-GENERAL OF INDIA IN COUNCIL.

"1. THE great practical importance of Statistical enquiries, and the attention which they now receive from the most enlightened European Governments, have induced us to take measures for investigating the Satistics of the Countries under our administration, and for arranging and preserving in a form convenient for reference, the information which may be attainable.

"2. With the view of accomplishing these ends, we have formed a Statistical Department in our Home Establishment, in which the requisite enquiries will be conducted, and the materials thereby obtained classified and compared.

"3. The voluminous Records and Documents in our possession contain a vast amount of Statistical information, and the labors of the new Department will, in

the first instance, be directed to extracting and rendering it available for reference; these duties, which have already commenced, will continue for a long period to claim a large share of the time and attention of the Department, but the results will be imperfect unless by the co-operation of our Governments in India in collecting and transmiting Statistical information we are enabled to remedy the defects, correct the inaccuracies, and as the condition and circumstances of all countries are in many respects constantly varying, to note the changes which time or other causes may produce.

"4. We do not doubt that our servants will cheerfully afford their assistance for these purposes, and as the aid which they may render in this respect is not intended, and must not be permitted, to interfere in any degree with their ordinary duties, no detriment will arise to the public Service, but on the contrary much advantage may be expected from the transmission home of such information as to local details which so many of our servants cannot fail to possess.

"5. Information will be most desirable on such subjects as the following :

"LAND.—Area. Geological structure. Natural aspect. Soil. Atmosphere and Climate. Productions. Modes of cultivation. Prices of principal products. Tenure and occupation. Modes and rate of Assessment. Labor employed, and its remuneration.

"WATER.—Navigable Rivers. Description of. Length of. How far navigable. Vessels employed on them.

"LAKES.—Description and situation.

"CANALS.—Their purposes. Length and depth. Vessels employed on them. Cost and return on the outlay. Wells and Tanks. Means of irrigation in each district. Harbours, and Shipping frequenting them.

"CITIES.—Towns and Villages. Situation and general description. Number of houses, and whether Puckha or Kutcha.

"POPULATION.—Numbers of people of different descriptions. Employment. Languages, Condition, Health, and Disease. Ditto of Troops especially—with presumed causes of healthy or diseased state, and the treatment (not strictly medical) found to be useful.

"WEALTH.—Education, and method of pursuing it. Charitable Institutions, not Educational. State of litigation and of crime. Police, number, remuneration, and efficiency.

"COMMERCE.—Manufactures. Capital employed. Imports and Exports from official sources. Exchange. Weights and Measures. Coins, Banking operations, Lending and borrowing. Modes of transit and communication. By Land, by Water. Impediments and their duration. Fords, Ferries and Bridges. Postal arrangements. Taxation. Sources of Revenue, and produce of each Tax. Mode of Collection. Number in Sebundy or other Corps engaged in collecting Revenue. History, and Antiquities, facts illustrative of early or more recent history, and of changes, Political or Agricultural. Public Buildings.

"6. We need scarcely observe that in Statistical investigations, the most rigid accuracy as to matters of fact is indispensable. Erroneous information will be worse than none, because it can but tend to mislead.

"7. There may be some subjects, especially those relating to physical science, with which our servants generally may not be minutely acquainted, and no statement on these or any other matters of enquiry will be of any value, unless they be both precise and accurate. Where the requisite measure of scientific knowledge is not possessed by others, it may, perhaps, in many cases, be supplied by our Medical Officers, and their aid will, we doubt not, be cheerfully rendered whenever required.

"8. In conclusion, we direct attention to the following general instructions :—

"9. In all cases where practicable, reports should be the result of the personal knowledge of the Officer reporting, and where such is the fact, it should be mentioned.

"10. Where from any cause the personal knowledge of the Officer cannot be extended to any object of enquiry, the authority on which the reported facts rest must invariably be stated, either in the margin or in the body of the report.

"11. When estimates only can be furnished, the grounds of each estimate must be stated, and the reasons for adopting it.

"12. Where information is orally given, it should be committed to writing at the time,—in like manner personal observations should be recorded at the moment of making them.

"13. In addition to the names by which places are known among Europeans, it would be desirable that the original names should be given, both in the Devánágari* and Urdu character, according to the best authorities, especially local and native.

"14. In regard to coins, weights and measures, care must be taken to preserve uniformity as to valuation, comparison, and conversion, and to insure this, Prinsep's Useful Tables may be taken as a guide.

"15. Where any material variations exist in different parts of any country, or divisions of a country, reported on, the nature and limits of such variations should be precisely pointed out.

"16. It will be observed that the greater part of the instructions above are designed to ensure accuracy, the importance of which we have already adverted to. It is the more necessary to dwell upon this point, inasmuch as some previous attempts to afford statistical information are unsatisfactory, because obviously incorrect.

"17. Thus in a calculation † made of the population of the North Western Provinces in 1826 (excluding the Ceded Districts on the Nerbudda, and those ceded by the Rajah of Berar,) founded on an actual enumeration of the villages in those

* The Proclamations and State Advertisements in the Calcutta Gazette are usually printed in the Devanagari, as well as in the Urdu or Arabic character.

† Vide statements of the extent and population of British India, as officially returned by the Searcher of Records of the East India Company in first Appendix to the third Report from the Select Committee of the House of Commons 1831. These statements have been adopted by the Hon'ble Mr Elphinstone. Vide his History of India, Vol. 1, Page 5.

Provinces, and a partial enumeration of the houses, the amount is taken at 32,206,806, and the number of square miles occupied by this vast mass, as ascertained by measurement upon a map, is stated to be 66,510. Thus, rejecting fractions, it would give a population of 484 to the square mile; while in an estimate of the population of the principal portion of the Lower Provinces of the Bengal Presidency in 1822, the amount is given at 37,503,265, and the amount in square miles (ascertained as in the North Western Provinces by measurement upon a map) at 153,802, affording no more than 243 inhabitants to the square mile, little more than half the number claimed for the North Western Provinces, notwithstanding that the Lower Provinces contain the great Cities of Calcutta, Dacca, Moorshedabad, and Patna, and the populous tracts around them.

"18. But the population of China, universally considered one of the most densely peopled countries, is, according to the highest native * estimate, only 277 to the square mile.

"19. Further, in a Statement of the Statistics of the North Western Provinces, printed by order of the Lieutenant Governor, and bearing date the 25th February 1842, exhibiting a view of the area and population of twenty-two Districts, constituting by far the larger portion of those Provinces, we observe particulars which lead us to suspect that even this latter document is not trustworthy. *Aligurh*, a district without any considerable Town, is stated to have an agricultural population of 56,679, and a non-agricultural population exceeding it more than *eleven times*, the number given being 644,499; while the District of Benares, containing the great and populous city of the same name, which, with its suburbs, has been estimated to contain 200,000 souls, is said to have 299,167 agricultural inhabitants, and only 145,940 non-agricultural.†

"20. We notice these extraordinary errors, that we may impress upon those who may be called upon to act upon our present orders, the necessity of employing such vigilance and attention as may be sufficient to guard against the transmission hereafter of any statement so deficient in accuracy.

"21. It should be fully borne in mind, that every statement that may be furnished will undergo searching examination at home, and we trust that each one will be prepared with such care as may ensure our approbation.

"We are, &c.

"(Sd.) J. W. Hogg.
„ H. St. G. Tucker,
„ John Loch.
„ J. L. Lushington.
„ John Cotton.
„ W. L. Melville.
„ W. H. C. Plowden,

(Sd.) F. Warden.
„ E. Macnaghten.
„ H. Shank.
„ J. Petty Muspratt.
„ Henry Willock.
„ John C. Whiteman.
„ Henry Alexander.
„ Robert Campbell."

"London, *the 3rd June*, 1846."

* Census taken in 1812. Vide Davis's China, page 413.

† Note.—According to Mr McCulloch, vide Geographical Dictionary, Vol. 1, page 852, the relative density of the population of France, abounding as it does in capital manufactures, and large towns, is only 164 to the square mile.

From Lieut. Col. P. M. Melvill, Secretary to Government, Marine Department, dated 1st December, No. 1717 of 1846, intimating that as Her Majesty's 17th Regt. is about to proceed to England, it has become necessry to recall Serjeant Moyes of that Regiment, who is conducting the Tidal and Meteorological Observations at Aden, should he not be willing to purchase his discharge or volunteer into one of Her Majesty's Regts. serving in India. The Political Agent at that station has in the mean time been directed to make such arrangements as may be in his power for the care of the instruments, and, if possible, the continuation of the observations.

From Messrs Remington and Co., dated 5th January, 1847, enclosing a copy of the Society's account current with them up to the 31st July, 1846, exhibiting on that date a balance of Rs. 1865, 5 annas, 3 pies, (Rs. 1865-5-3) in the Society's favor.

After some conversation as to the best mode of carrying the wishes of the Court of Directors into effect as explained in the letter of Mr. Pringle, it was agreed that the printed papers on the subject should be embodied in the next issue of the Society's Transactions; and that members should be particularly requested to assist in furnishing any items of the information desired that might be procurable; the Secretary of the Society being charged with the responsibility of arranging these, and forwarding them to the Court of Directors, who should also be provided with sets of the Society's Transactions, for the use of the newly-created Statistical Department. It was stated that the printed papers just referred to had already been published in nearly all the newspapers in India, so that members must already be well aware of their contents.

In reference to Colonel Melvill's letter relating to Mr Moyes, it was stated that that officer had volunteered into another regiment, and would continue his services in conducting the observations at Aden. No general meeting having occurred since the receipt of Colonel Melvill's letter of June in reference to a Tidal Observatory near the Lighthouse on Perim Island, the Secretary was directed to address Government on the subject;—respectfully to call attention to the circumstance that none of the Aden observations promised to be forwarded them through the Observatory, had yet reached them; and as Mr. Orlebar, to the care of whom the charge of the Aden and Kurrachee observations had been entrusted, had returned to Europe, the Society renewed their offer to take in hand the supervision of these, should this meet the pleasure of Government. The arangements in Scinde, which were suspended in consequence of the demand for men and absence of officers when the army marched on Bahawulpore, might now be resumed on the terms formerly specified by Government and about to be acted on when the interruption referred to occurred. There were tide-gauges in store, at the service of Government, both for Scinde and Perim. Government had acquiesced in the establishment at the latter place, provided the duties were not beyond the capacity of the keeper of the lighthouse—an intelligent native,—as there were no Europeans on the island. The expence of the instruments for Perim would ultimately fall on the grant conceded by the Admiralty, provided they acquiesced in the limitations formerly made on the scheme intended to be patronized by them, which might now once more be ex-

tended, should such be the pleasure of Government, to the limits originally proposed.

A fresh issue of the Transactions was laid before the Society, and it was intimated that the store of papers considered worthy of publication was at present nearly exhausted.

The Treasurers reported that after the defrayment of all their liabilities, and collection of the payments now falling due, the Society would have a balance of nearly three thousand rupees in its favour ready to be expended on further publications.

The thanks of the Society were ordered to be given to the various contributors to its repositories and transactions.

The Secretary was directed to write to the Lords of Her Majesty's Admiralty on the subject of the scheme of observation formerly patronized by them, so soon as an answer had been received from the Local Government.

The meeting then adjourned till the 1st Thursday of May.

THE Anniversary Meeting of this Society took place in their Rooms, Town Hall, on Thursday the 6th May 1847, at 3 o'clock P. M.

Present.—Dr. J. Bird, (in the Chair); Dr. J. Scott; Captain H. J. Barr; and Dr. Geo. Buist, L. L. D., Secretary.

The minutes of the Ordinary Quarterly Meeting held on the 4th February last were read and approved.

Resolved.—That the Hon'ble the Governor should be requested to become Patron to the Society.

The following papers, books, letters, and map, were then laid before the meeting:—

PAPERS.—*By Government.*—Extract from a Journal of a Steam trip to the North of Baghdad in April 1846, with notes on the various objects of interest met with, by Lieutenant J. F. Jones, I. N., accompanied by three drawings representing the modern town of Samarah, and the ruins around it, and the remains of the Forts of Quadasiyeh and Tekrit; with a letter from A. Malet, Esq., Secretary to Government, Secret Department, dated 9th February, No. 65 of 1847.

By the Authors, through Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden.—Maximum and Minimum of Barometer and Thermometer, as taken by Captain Haines, at Steamer Point, and by Sergeant W. Moyes, at Aden, from 1st June to 10th October, 1846.

BOOKS.—*By Government.*—Thornton's [Edward, Esq.,] History of the British Empire in India, vol. 6; with a letter, No. 751, dated 20th March, 1847, General Department, from W. Escombe, Esq., Secretary to Government.

By Government.—Observations made at the Magnetical and Meteorological Observatory at Bombay, from April to December, 1845, and printed by order of the Hon'ble East India Company, under the superintendence of A. B. Orlebar, M. A., Lincoln College, Oxford, Elphinstone Professor of Astronomy and Mathematics; with a letter, No. 15, dated 23rd April 1847, from Commander C. W. Montriou, I. N., in charge Observatory of Bombay, Colaba.

MAP.—*By the Quarter-Master-General of the Army.*—Route Map of the Bombay Presidency, including Scinde, surveyed and collected by the Quarter-Master-

General's Department, Bombay Army; with a letter from Lieut. Col. N. Campbell, dated 22d March 1847.

LETTERS.—From Lieut. Col. P. M. Melvill, Secretary to Government, Military Department, No. 656, of the 12th February, 1847, transmitting, with reference to his former communication of the 1st December, 1846, copies of correspondence from the Deputy-Adjutant-General of Her Majesty's Forces in India, intimating that an application has been made to the Horse Guards for permission to allow Sergeant Moyes, Her Majesty's 17th Foot, to be transferred to the Hon'ble Company's service, and in the meantime permitting that non-commissioned officer to remain in charge of the Tidal and Meteorological observations at Aden, on the embarkation of Her Majesty's 17th Regiment for England, pending the orders of His Grace the Duke of Wellington on the subject.

From W. Escombe, Esq., Secretary to Government, General Department, No. 624, of the 4th March, 1847, requesting that the Secretary of the Society would put himself in communication with the Post Master General, who has been instructed to forward, if practicable, the Books and instruments &c. alluded to in his letter under reply, to the Agent for the Governor General N. W. Frontier, by Post, free of charge.

The following Gentleman was then elected a Member of the Society.

Lieutenant H. A. Frazer, I. N. Proposed by Captain H. J. Barr, and seconded by Dr. Scott.

An abstract of the votes for the Office-bearers for next year having been made, the following appeared to have been chosen by a majority of votes on the printed list:—

Vice-Presidents.

1. The Hon'ble J. P. Willoughby, Esq.
2. The Hon'ble L. R. Reid, Esq.
3. Captain Sir R. Oliver, Kt., R. N.

Resident Members.

1. Major J. Holland.
2. Captain H. B. Lynch, I. N.
3. Lieutenant G. Jenkins, I. N.
4. Dr. C. Morehead.
5. Lieut. Col. P. M. Melvill.
6. Lieut. Col. N. Campbell.
7. C. J. Erskine, Esq.
8. Dr. J. Bird.
9. Dr. J. Glen.
10. Dr. J. McLennan.
11. R. K. Pringle, Esq.
12. Commander J. A. Young, I. N.

Non-Resident Members.

1. Major H. C. Rawlinson.
2. Captain E. P. Del'Hoste.
3. Captain G. Fulljames.
4. Major G. LeG Jacob.
5. Captain T. G. Carless, I. N.
6. Major Sir W. C. Harris, Kt.
7. Lieutenant C. J. Cruttenden, I. N.
8. Lieutenant W. Christopher, I. N.

The accounts for the year having been exhibited, showed a balance of Rs. 2544-9-6 in the hands of the Treasurers. In the course of the year, Rs. 1315 had been expended on printing; for the establishment Rs. 564; for contingent and other charges, Rs. 236-15-9: in all, Rs. 2115-15-9.

Annual Statement of Receipts and Disbursements of the Bombay Geographical Society, 1st May 1846 to 30th April 1847.

Disbursements.				Rs.	A.	P.
April 30th, 1847.						
To Printing				1,315	0	0
„ Establishment				564	0	0
„ Contingent expenses				175	15	9
„ Mr J. T. Bell's bill for duty, customs, clearing charges &c., on 3 cases containing Instruments and Books, forwarded by Mr Shillinglaw at London for Mr Patrick Vans Agnew, at Lahore	46	11	0			
„ Cooly hire, packing charges, Boat freight for sending 4 cases (addressed to P. Vans Agnew, Esq. at Lahore) over to Kurrachee, in charge of the Secretary to the Scinde Association there	14	5	0			
				61	0	0
				2,115	15	9
Balance in favour of the Society, viz.						
„ In the hands of the Treasurers up to this day	2,485	11	11			
„ Ditto...in the hands of the Secretary	58	13	7			
				2,544	9	6
			Rupees	4,660	9	3

Receipts.				Rs.	A.	P.
April 30th, 1846.						
By Balance in the hands of the Treasurers up to this day	2,220	11	11			
„ Ditto...in the hands of the Secretary	84	12	0			
				2,305	7	11
August 15th.						
„ Amount received from Government for supplying 300 printed copies separately stitched, of an extract from a Report on the district of Babriawar by Captain G. LeG Jacob, late 1st Assist. to the Political Agent at Rajcote, as per Government order from Political Department, dated the 1st Aug., No. 3003 of 1846				200	0	0
April 30th, 1847.						
„ Ditto...of Government subscription for 12 months, at 50 Rupees per mensem				600	0	0
„ Ditto...of subscriptions of Members for this year				1,437	4	0
„ Ditto...of printed copies of this Society's proceedings sold				100	8	0
„ Ditto...of do. of the Royal Geographical Society's Journal sold				11	5	4
			Rupees	4,660	9	3

(Signed) GEO. BUIST,
Secretary to the Society.

Bombay, 30th April, 1847.

Some discussion occurred in reference to the backward state of the scheme of tidal and meteorological observations sanctioned by H. M.'s Lords of the Admiralty, and subsequently in part by Government. A letter had been written so far back as the 15th February, to the Secretary in the Military Department, renewing the offer formerly made by the Secretary, to superintend the observations over which it was purposed to place Mr. Orlebar in charge. To this no reply has hitherto been received. The letter proposed to have been sent to H. M. Lords of the Admiralty had been delayed until the receipt of the answer of the Bombay Government, as it appeared to be owing to the estrangement of the local observations from under the control of the Society that all other delays had arisen.

The meeting then adjourned till the 1st Thursday of August.

THE Ordinary Quarterly Meeting of this Society took place in their rooms, Town Hall, on Thursday the 5th August 1847,—the Hon'ble L.R. Reid, Member of Council, Vice-President, in the Chair. The following Members were present:—Dr. J. Bird; C. J. Erskine, Esq., C. S.; Dr. J. Glen; Lieut.-Col. G. Moore; Manockjee Cursetjee, Esq.; Ali Mahomed Khan, Esq.; and Dr. G. Buist, Secretary.

The Minutes of the Anniversary Meeting held on the 5th May last, were read and approved of.

Commander G. B. Kempthorn, I. N., was proposed as a member of the Society by Dr Buist, seconded by Dr. J. Bird, and unanimously elected.

The following donations were presented, for which the Secretary was directed to return the best thanks of the Society to the donors:—

PAPERS.—By the author, through Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden.—Meteorological Observations, as taken on Shum Shum, and on Seerah Island, during the month of June 1847: and Diagram, shewing the time of high and low water at Aden, as traced by the tide-gauge, between the 13th and 29th June, and from 29th June up to the 13th July 1847, by Serjeant W. Moyes,—with a letter dated Camp Aden, 16th July, 1847.

BOOKS.—By Government. Printed Copy of the Report of the Superintendent of Roads and Tanks for the year 1845-46, with a letter, No. 1780, of the 25th June 1847, from W. Escombe, Esquire, Secretary to Government, General Department.

By the Royal Geographical Society of London, through Mr J. W. Richardson, Bookseller of London, to the care of J. T. Bell, Esquire, of Bombay.—The Journal of the Royal Geographical Society of London, vol. 16th, part 2d, of 1846; with a letter from the above Bookseller, East India Agent, &c., dated London, No. 23, Cornhill, March 12th, 1847.

By the Société de Geographie de Paris, through the Royal Geographical Society of London, and Pestonjee Framjee and Co., of Bombay.—Bulletin de la Société de Geographie, tome 5 of 1846, tome 1 of 1844; and Grammaire et Dictionnaire abreges de la langue berbere composes par feu venture de paradis, &c. &c, of 1844,—with a letter dated Paris, le 1st Mai, 1844.

By the Sociéte de Asiatique de Paris, through the Royal Geographical Society of London.—Journal Asiatique ou Recueil de Memoires &c., tome 7,

No. 35, Juin; tome 8, No. 36, Juillet; tome 8, No. 37, Aout, Septembre; and tome 8, No. 38, Octobre 1846.

LETTERS.—From C. J. Erskine, Esq., Private Secy., dated 11th May, 1847, acknowledging the receipt of the Society's letter of the 7th May 1847, enclosing an extract from the Minutes of a Meeting, intimating, by desire of the Honorable the Governor, that his Honor feels highly gratified by the request therein contained to become Patron of the Society, with which he has much pleasure in complying.

From John Macleod, Esquire, Secretary to the Scinde Association, dated Kurrachee, 19th April, 1847, acknowledging the receipt of the Society's letter of the 30th March, No. 11 of 1847, and intimating that his Excellency the Governor of Scinde has been good enough to direct that the boxes of books and instruments therein alluded to, shall be forwarded to Sukkur as soon as possible after their delivery there, and further states that steps will be taken for the onward transmission from Sukkur of the articles in question by the first opportunity.

From W. Escombe, Esquire, Secretary to Government, General Department, dated 17th July, No. 2026 of 1847, transmitting the pages of the 4th volume of "Thornton's India" which were missing when it was presented to the Society in the month of February 1845.

Copy of a printed Circular from Colonel J. R. Jackson, Secretary of the Royal Geographical Society, dated London, January 1847, intimating that Mr. John Shillinglaw, late Librarian of that Society, has been appointed the Society's Agent for the supply of the Journal of the Geographical Society of London to all such Honorary and corresponding Members, and Scientific and Literary Institutions, as are entitled to receive copies.

There was scarcely any business of note before the Society. A lengthy conversation occurred amongst the members as to the best mode of forwarding the various objects the Society had in view. It appeared that the funds were in a singularly flourishing state, and that any enterprise that was deemed desirable might be undertaken. A new number of Transactions would be placed in the hands of the printer so soon as a sufficiency of papers was in readiness. In reference to the great scheme of Tidal Observations, it was stated that no reply had been received from Government to the Secretary's letter of the 19th Feb. last, and that the want of this had prevented the renewal of correspondence with H. M.'s Lords of the Admiralty. It was stated that the matter must, through inadvertence, and pressure of more emergent business, have fallen aside,—no obstacle or indisposition on the part of Government to do everything that could reasonably be desired being suspected to exist. The Secretary was directed to address Government on the subject, and to renew the offer of supervision and publication formerly made by the Society. The necessity of this became every day more and more apparent, the elaborate but very intricate diagrams of Mr Moyes, now and formerly laid before them, indicating the extreme necessity of a directing and guiding power before any results of value could be looked for.

The Meeting then adjourned to the first Thursday of November.

THE Ordinary Quarterly meeting of this Society took place in their rooms, Town Hall, on Thursday the 4th November 1847, at 3 o'clock P. M. Present—Captain H. B. Lynch, I. N., member in the chair.—Commander D. Jenkins, I. N.; Dr J. Glen; Captain H. J. Barr; and George Buist, Esq., LL.D., Secretary.

The minutes of last meeting were read and approved of. The Secretary read the letters written by direction of the Society to the Secretary to Government, Marine Department, enclosing copy of letter of February 1847, formerly directed to be written on the same subject—to neither of these had any answer been received. The Secretary was directed to address Government, taking the opportunity of doing so offered by the letter of Mr Moyes, and the Report in the *Athenæum*, to draw up a plan for rendering effective the Aden observations, and make tender of this to Government should they decline other aid; and to renew the offer which if accepted of would restore the original scheme to its integrity. The letter was directed to be submitted to the Committee, in consideration of the limited attendance at the present meeting. A lengthened conversation occurred on the subject of the Physical researches generally in contemplation by the Society, and in which the phenomena attendant on the Hurricane of April were specially adverted to,—the Society having been fortunate enough to secure a large mass of valuable papers on the subject. The following donations were presented, for which the Secretary was directed to return the best thanks of the Society to the donors.

PAPERS.—By Government.—A Translation, by Captain G. G. Malet, (late Resident at Khyrpoor,) of a work by an Historian called Moosoome, containing a History of Scinde from the year 676 to 1623, was forwarded by Mr. Chief Secretary Malet on the 20th September last, for the inspection of the Society, and it was intimated by that gentleman, that a copy of the paper would be presented to the Society if it were willing to publish it.

By Government.—Two Reports of Journeys made into the interior of the south-east coast of Arabia, viz. 1st, An account of a journey from Soor to Jahlan, and thence to Ras Roves, on the 6th November 1845, by Messrs. Ward, Silvester, and James, of the Honorable Company's Surveying Birg *Palinurus;* and 2nd, an account of an Overland journey from Leshkairee to Meskat and the Green Mountains of Osman, on the 22nd November 1855, by Mr. Cole, of the East India Co.'s S. B. *Palinurus;* with a letter from A. Malet, Esq., Chief Secretary to Government, Marine Department, dated 23rd September, No. 1330 of 1847.

By the Author.—Drawings shewing the time of high and low water at Aden, traced by the Tide-Gauge, between the 13th of July and 9th of September last, by Serjeant W. Moyes; with a letter dated Camp Aden, the 16th September, 1847.

BOOK.—By the Author.—Address to the Ethnological Society of London, delivered at the Anniversary Meeting on the 29th May 1846. By Rear-Admiral Sir Charles Malcolm, President.

LETTERS.—From H. E. Goldsmid, Esq, Private Secretary, dated Dapooree, the 17th August, 1847, conveying the best thanks of the Honorable the Governor

to the Bombay Geographical Socieey for the copies of its Transactions forwarded on the 12th August last.

From D. J. Bird, Secretary to the Bombay Branch of the Royal Asiatic Society, dated the 14th August 1847, forwarding copy of a letter from the Foreign Secretary to the Government of India, intimating that a Mission was about to start to the Frontiers of Chinese Tartary, and that he would be glad to learn whether there were any questions of Literary or Scientific interest which Members of the Society might wish to be made the subjects of investigation by the Mission.

From Dr. J. Bird, dated the 11th September 1847, acknowledging the receipt of the Society's letters of the 6th and 7th instant, and returning the thanks of the Asiatic Society for the suggestions on various points to which the attention of the Members of the Mission proceeding to the Frontiers of Chinese Tartary may be usefully called,—and intimating that the same had that day been forwarded to Mr. Elliot, the Foreign Secretary with the Governor-General at Simla.

From Dr J. Bird, Secretary to the Bombay Branch of the Royal Asiatic Society, dated the 18th October 1847, forwarding an original letter of thanks from the Foreign Secretary with the Governor-General, for the able questions on the 'Ancient Beaches' and 'Salt Deserts' of Central Asia, furnished by this Society for the Members of the Thibet Mission.

"No. 32 of 1847.

"To the Secretary of the Bombay Branch of the Royal Asiatic Society.

"SIR,—I have the honor to acknowledge your letter of the 14th instant, containing an extract from a letter of the Secretary to the Government of India, in which it is intimated that an exploratary expedition, consisting of Captain Cunningham, Dr T. Thompson, and Lieutenant Strachey, has been appointed to proceed into Chinese Tartary, the Secretary desiring to be informed whether there be any question of Literary or Scientific interest desired by you to be investigated by the Mission. In reply to this I am directed by the Geographical Society to state that the names of the gentlemen composing the Mission are too well known to permit of any suggestions being made to them with hope of advantage, on the subject which more especially engages our attention, and which will be one main object of their researches—Political Geography,—as on this their objects must be the same as our own. In Physical Geography the Society might perhaps draw their attention to certain points on which enlightenment, were it procurable, would be pre-eminently desirable: not doubting, at the same time, that the suggestions about to be made are just those most likely to have occurred to themselves as pre-eminently worthy of attention.

"The Baron Humboldt has rendered it much more than probable that at a period shortly before the commencement of our historical æra, the concavity of Turan may have been one vast inland sea, connected on the one hand with the Caspian, on the other by the Balkash and its adjoining lakes, and by channels more or less intricate, with the Icy Sea: and that in the time of Herodotus, or probably as late as the Macedonian invasion, the Aral was merely a Bay or Gulf of the Caspian;

and there seems every probability that the great elevations chiefly prevailing betwixt the 20th and 45th parallels are succeeded by a vast expanse of comparatively low lands, which at no distant date in our Geological æras may have formed the bed of the Ocean.

"It has of late formed one of the most interesting divisions of Geological research to investigate the changes of level, the upheavals and depressions, which at a comparatively recent period of our Geological History have affected the earth, and to trace the elevated shores, the beaches and terraces, which in almost every quarter of the globe mark the boundaries of its former waters. Should the explorers reach any of the regions in which such things are discernible, no notices, however slight, which could be made concerning them, would be considered unimportant by the Society.

"In immediate connection with this the condition of salt deserts, salt ranges of mountains, and formations of rock-salt, will all come to be explored; and in reference to the last of these, the Society would feel much gratification in being made aware as to whether any traces of Animalculæ or their debris were discernible in the salt; and whether it was found associated with the rocks of the new red sand-stone formation with which in other quarters it is generally connected. Where limestone prevails in a salt desert, the transformation of carbonate into sulphate of lime, occasioned apparently by the mutual decomposition of the sulphates of the salt and calcareous constituents of the earth, is generally discernible; this phenomenon presenting itself in Scinde, Persia, Arabia, and Egypt, and in most places, it is believed, where the combination of circumstances referred to exists. It would be important to know whether it was universal.

"It would be of the utmost importance to observe whether sea shells exist in any of the salt deserts that may be traversed; and, if so, whether they be of any existing species, as well as to observe whether any of the ligniferous rocks such as those about Cairo, Scinde, and on the Coromandel coast, can be traced. All information regarding the extent of the agency of Icebergs and Glaciers, in the removal from place to place of masses of earth and stone, makes the examination of transported boulders, especially of those marked with grooves, and of gravel, Till &c., which seem to form moraines, or indicate the existence of ancient glaciers, is of the utmost interest to the Society.

"The Mission is stated to be in possession of a suply of Magnetic instruments: all observations on the dip and direction or vertical and horizontal declination of the needle—the intensity of magnetic force, the diurnal variation and effect, if any, of local attraction—would be considered of the utmost interest and importance; as well as any note which might be made on the influence exercised on the magnet by the Aurora Borealis, should the mission reach a latitude at which this is discernible.

"In reference to Barometers and Thermometers, of which the Secretary to the Government of India states the expedition to possess a supply, it would be considered highly important to ascertain the daily range, and hours of maxima and minima. One reading for 24 consecutive hours at any of the most remarkable points reached by the expedition, would be considered most valuable. As the epochs of change

recur, so far as is known, in all parts of the world from two to three hours before noon and midnight, and from four to five hours after them, ten minutely readings from ¼ to 9 to ¼ past 10, and from ½ past 3 to ½ past 5 A. M. and P. M., would go far to determine all that was required to be ascertained. When the approximate hours of maxima and mimima were known, two observations daily at each of these would shew the menstrual inequality, if any existed—or perhaps indicate the inequalities of the year. All the observations of each day, before being of use for comparison with each other, must be taken on the same spot. Indeed, until the daily fluctuations of the mercury be determined, all observations made with the Barometer, on altitude, must prove fallacious where no fixed standard of reference can be had recourse to. The kind of Barometer should be mentioned, as well as the maker's name: and the fact indicated as to whether or not the mercury has been boiled in the tube.

"In most parts of the world the temperature at ½ past 9 or 10 o'clock gives the mean temperature of the day. One set of hourly observations would indicate whether it was so or not in the regions about to be explored; and, if so, by the help of self-registering Thermometers, a single inspection of a pair of instruments at the proper hour would give the maximum, minimum, the range, and the mean. At Bombay the mean temperature of September is also the mean of the year, and should the explorers be out during the month referred to, it might be well carefully to note its heat. The 9 o'clock observation will probably give the means both of the month and the year. It is not likely a year will be spent by them in any given locality; nor is it safe to assume a local law as of universal acceptation: but we might put up with this information until better could be procured. Deep springs and wells will give a close approximation to the mean temperature of the spot throughout the year, as will a thermometer sunk three or four feet under the surface of the ground, and carefully covered over. We are so utterly devoid of all knowledge of the regions about to be visited, that to ascertain the curvature and direction of the Isothermal lines would solve an important problem in physical geography.

"In case the mission should not be provided with self-registering Thermometers, or in the event of these being broken, it may be mentioned, though probably well known to the gentlemen composing it, that a bottle of water or other vessel of considerable size, sunk in the earth, with a thermometer enclosed, will in the course of eight or ten hours acquire the temperature of the surrounding mediæ, and will, if too much time is not lost in removing it, retain its heat long enough to allow the thermometer to be examined; and will give indications probably within a degree or so of accuracy.

"Should other instruments fail, this will give a pretty close approximation of the altitude of any place in relation to some other in the neighbourhood of which the mean temperature has been determined.

"The humidity of the atmosphere is quite as important a matter in climatology as its temperature or pressure; and the Society would strongly recommend the assiduous use of the wet-bulb thermometer.

"The tint of the sky, and force of the wind, in these unexplored regions, many of which attain such stupendous altitudes, would be interesting; and in defect of, or

addition to, any observations which may be made with the common actinometer, the Society would recommend to the consideration of the mission the simple contrivance of Necker; where, by the use of a coloured card, so much of what is desired to be known may be determined: the wind gauge of Mr. Lind, one of the simplest and most portable of instruments, will give all the indications that are wished for on the strength and velocity of aerial currents.

"These comprise the majority of the most prominent points on which the Geographical Society would most desire enlightenment, though to no branch of human knowledge are they at any time indifferent. They are satisfied that to most of them Captain Cunningham, Dr Thompson, and Mr Strachey, would most likely at any rate devote attention; they forward this letter in compliance with the wish of the Secretary to the Government of India; satisfied, that if what they have done be regarded as superfluous, no worse view is likely to be taken of it, and supposing, at the same time, it may just be possible they have touched on some point which may stimulate enquiry.

"I have the honor to be, Sir, your most obedient servant,
"(Signed.) G. BUIST, Secretary to the Society."
"Geographical Society's Rooms, Town Hall, Bombay, 6th September, 1847."

"No. 33 of 1847.

"To the Secretary of the Bombay Branch of the Royal Asiatic Society.

"SIR,—In continuation of my letter of the 6th instant, in reference to the information desired by the Geographical Society on the subject of the Vestiges of the Northern Ocean which might probably become traceable by the Mission about to be sent into Chinese Tartary, I have now the honor to enclose, for transmission to the Secretary to the Government of India, copy of a letter from Mr Robert Chambers, requesting explanation on a similar class of subjects to which the Geographical Society called attention; entertaining no doubt whatever that the Mission will be as anxious to gratify the wishes of a distinguished man of letters as of a learned corporation, where the objects of both are the same.

"The lowermost, or twelve feet, beach spoken of by Mr Chambers, is traceable all around our shores. It forms the Bombay esplanade and drill ground at Colaba, with the whole of the lower ground along the Concan. It is peculiarly conspicuous at Aden, and along the shores of the Gulf of Suez, where it extends many miles into the interior. Another of the beaches of Mr Chambers probably constitutes the whole of the desert portion of Scinde, and of the salt plains betwixt the Indus and Ajmeer. Ascending still higher, we find the most unmistakeable evidences of the existence of a former ocean all over the desert betwixt Cairo and Suez, at an elevation of above 800 feet: nor does it appear to what altitude such things may not be looked for. It is much more than probable, in fact, that in all salt deserts, or wherever Muriate of Soda is to be found in great abundance, other evidences may be detected, at no great distance, of the former presence of the ocean at a period of very recent date compared to that of the origin of the newest of our solid rock formations.

Caves are abundant in most parts of the world. There seem only two classes of causes by which they can have been formed—the sudden disruption of rocks by violence after their induration, or erosion by air or water The aspect of the rock itself will always indicate unmistakeably and at once any circumstances in which the first cause has assisted:—decay and erosion by the action of the air or of moisture, can only occur where the matter affected is soft and easily decomposed. Where neither of these explain the phenomenon, its appearance can only be accounted for by the operation of water in large masses. The aspect of the country will indicate whether this has risen from the sea, from lakes, or from rivers.

I have not had it in my power to refer this letter to the Committee of the Geographical Society, as I was apprehensive it might thereby have been too late for your despatch; and though I am persuaded the views expressed in it will be adopted by them, I am not at present entitled to set them forth as stamped with the weight of their authority.

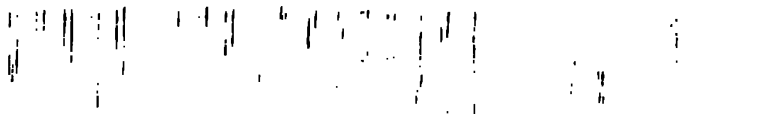
I have &c. (Signed) GEO. BUIST, Secretary to the Society.

Geographical Society's Rooms, Town Hall, Bombay, 7th September, 1847.

ST. ANDREWS, *July 18th*, 1847.

MY DEAR SIR,—I beg to address you on a subject which I think will be interesting to you, and on which I crave your kind assistance. For about a year past I have given most of my spare time to the examination of Ancient Beaches. I have found and measured them all round this island, and even in Ireland and France. Every where there is a series at uniform heights, leading to the unexpected deduction that the change of relative level of sea and land, by whatever means accomplished, was a process observing equability over a very large region. I read a paper on the subject at the Oxford meeting of the British Association; but the obvious bearing of the facts against prevalent theories caused them to be characterised by Buckland, Lodgewick, &c., as "an audacious generalization," which I shall perhaps have occasion by and bye to remark upon as an exceedingly good joke. Being only stimulated by this opposition to further research in the same line, I am now enquiring after proofs of extended uniformity in Norway and America; and the facts tending to this effect which I have already obtained, would probably surprise you not a little. There are undoubtedly terraces in North America from 60 up to 1000 feet, coming almost to a perfect uniformity with those I have discovered in Britain. I do not yet say that they are identical; but the appearances at present are all that way.

It may be a romantic and disappointing attempt, but I nevertheless wish you will look for terraces in your part of the earth, and have a few good specimens measured. I should not say disappointing, for, though they were found to be entirely discrepant, it were well to know so much; and even in themselves they would form a curious addition to our geological knowledge.—You have given some attention



MEETINGS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

THE Ordinary Quarterly Meeting of this Society took place in their Rooms, on the afternoon of the 3rd February 1848, at 3 o'clock P. M.—The Hon'ble J. P. Willoughby, Esq., Vice-President in the chair. Present: Lieut. Col. G. Moore; Lieut. Col. N. Campbell; Captain H. B. Lynch, I. N.; Commander G. Jenkins, I. N.; Revd. Geo. Pigott; Captain T. G. Carless, I. N.; Dr. J. Glen; Ali Mahomed Khan, Esq.; Captain J. P. Saunders, I. N.; and Dr. Geo. Buist, LL.D., Secretary.

The minutes of last Meeting were read, and approved of. In reference to the clause directing the Secretary once more to address the Government under the Marine Department on the subject of Tidal and Meteorological Observations, the Secretary explained, that shortly after the meeting, and before he had had time to write to Government as directed, he became aware that they were about to be addressed on the subject, and therefore forebore needlessly to trouble the Government. The letter intimated that the Government, in compliance with their wishes, were about to give directions to the effect that such abstracts as were required by the Society should be provided by the Colaba Observatory; and that the observations at Aden would be transferred to their charge. Subsequent letters from Colonel Melvill intimated, that at Kurrachee, Mandavie, and Porebunder, it was considered eminently expedient that observations should be made. The letters had been circulated to the Committee with a long and minute memorandum from the Secretary, as to what seemed desirable to be done. This bore the following minute by Mr Willoughby, with the initials:—"The whole of the Secretary's suggestions appear to me to be very judicious, and should, I think, be immediately adopted. Mr Moyes has lately had an assistant granted him, which will facilitate the arrangements prepared at Aden." J. P. W., 27th November. L. R. R.; J. H.; J. B.; Griffith Jenkins.

Mr Willoughby had here especially referred to the case of Mr. Moyes, and Captain Jenkins had written his name in full approval of the recommendation to adopt the memorandum, and of course act on it so soon as occasion required.

The Secretary, considering this an authority for further proceedings, had embodied a portion of its contents in those letters of 19th December, addressed to Col. Melvill, in the name of the Society, to which a reply had been received. In

this it was intimated, that the Society would be placed in direct communication with Captain Haines at Aden, and with the Superintendent of the Colaba Observatory; that the 3rd para of the first letter did not accord with the information in possession of Government, and had been referred to the proper quarter for explanation; and that it was deemed most expedient for all parties to commence operations with the 1st January 1848.

On the correspondence being read, the Revd. Geo. Pigott called attention to the following portion of the Secretary's first letter, referred to by Col. Melvill: a portion of it that applied to the Tide Gauges had been corrected in the second one: —"Letters also since then received from Mr Moyes, make us aware that he has for many months suffered from want of instructions; that he has repeatedly written on the subject but received no reply; and that he is at this moment ignorant who his superior is."

Of this Mr Pigott entirely disapproved, as casting improper reflections on Captain Montriou, keeper of the Observatory, who was made to appear neglectful of the duty of keeping Mr Moyes provided with the necessary schedules and instructions.

Captain Jenkins called the attention of the Meeting to the following extract from the report of the proceedings of the last meeting of the Society contained in the *Bombay Times* of the 6th November :—"It was quite clear from the letters of Mr Moyes, that though he was in no way to blame, so far as science was advantaged he might as well have been with his regiment: twenty months' observations, which otherwise might have been available, were utterly worthless."

The Society was thus made to cast reflections on Mr Montriou which they had not cast on him. He (Captain Jenkins) had reason to believe that the remark had occasioned much pain; and in observing, six weeks afterwards, a statement similar in effect in the memorandum of the Secretary already referred to, he had made enquiry, and was informed that the complaint of Mr Moyes was groundless, he having been provided with all the schedules and instructions desired by him.

In reference to the newspaper report, it was explained that it was not given on the authority of the Society: that the passage complained of was part of some verbal observations which had been made by the Society, and which it did not appear that any one concurred in: that in the minutes of the Society, the only documents with which they had to do, no allusion to Captain Montriou was made, and that nothing could be more inconvenient than for the Society to deal with newspaper reports, over which they had no control, as bearing the sanction of their authority. In evidence of the good faith in which the statement was made, the letters of Mr Moyes were produced. The Secretary also remarked, that when the memoranda were circulated, it was with the express view of obtaining the sentiments of the Committee, on which the Secretary was bound to act: that the memorandum in which the passage objected to when embodied in the letter to Col. Melvill had appeared, was approved of by the Committee authorized to act on it,—Captain Jenkins having subscribed his name at length. Had the slightest hint been given that there was anything contained in it which was questioned or disapproved of, immediate attention to it would have been given. The Chairman said that the memorandum, with the minute appended, was sufficient

warrant for writing ; but as Mr Moyes' statements were questioned, his letters did not appear authority enough for the paragraph complained of.—After some further discussion, the following resolution was ordered to be recorded, and to be embodied in the Society's reply to Col. Melvill :—

" Proposed by Capt. Lynch, seconded by Mr Pigott, and resolved—That this Society do express their regret that they should have made unwittingly any official statement to Government, in their communication of the 19th February 1847, in condemnation of the officer in charge of the Observatory, without due examination."

The Society next proceeded to the discussion of the subject to which the correspondence alluded, and after some conversation the following resolution was unanimously adopted :—

"Resolved—That the following gentlemen be requested to act as a Committee for the purpose of reporting on the best mode of carrying out the plan now experimentally approved by Government, and the probable expense which will thereby devolve on the Society."

One of the Tide-Gauges intended for observation was exhibited to the Meeting : its construction seemed so simple that it would be difficult for any one to misapprehend its use. The following donations were presented, for which the Secretary was directed to return the best thanks of the Society to the donors :—

PAPERS.—By Government.—Letter, No. 3116, dated 13th Nov. 1847, forwarding a Report (from R. N. C. Hamilton, Esq., Resident at Indore,) of a trip down the Nerbudda from Mundlaisir to Baroche, made by Lieut. H. L. Evans, of the 17th Regiment Bombay N. I., and Deputy Bheel Agent ; with sketches of the Sansadarra, and of a proposed road along the North Bank of the Nerbudda to Dauree, by Lieut. R. N. Keatinge, assistant to the Superintendent of Nimar ; together with a printed note on the Navigation of the River Nerbudda, by Mr A. Shakespear, Assistant Secretary to Government, Northwest Provinces.

By Government.—Remarks on the Course of the Hurricane which occurred on the Malabar Coast in April 1847, and on the probable position of the Steam Frigate *Cleopatra* at the time ; with a sketch. By Captain T. G. Carless, I. N. With a letter from Mr Chief Secretary Malet, dated 20th November, No. 1452 of 1847, Marine Department.

By Government.—Report by the Commander Indus Flotilla, of an Experimental Voyage up the Indus and Sutlej, made by the *Meanee*, steam-tender to the Pendant Ship *Mootnee*, with the *Ravee* Iron Flat in tow, having 16,000 maunds of merchandize on board ; with diary. By Lieut. W. Christopher, I. N., 1st Assistant Indus Flotilla. With a letter from Lieut. Col. P.M. Melvill, Secretary to Government, Marine Department, dated 26th January, No. 104 of 1848.

BOOKS.—By Government.—Two copies (one in English and one in Guzerathee) of a Prize Essay on Infanticide in Kutch, lately prepared by Bhawo Dahjee, a teacher in the Elphinstone Institution at this presidency. With a letter, No. 285, dated the 16th January, 1848, from Mr Chief Secretary Malet, Political Department.

By Government.—Horary Meteorological Observations made at the Hon'ble the East India Company's Magnetical Observatory at Madras, by Captain S. O. E. Ludlow, of the corps of Engineers, in the interval 1841-46 ; with a letter, No. 235, dated the 14th January 1848, from Lieut. Col. P. M. Melvill, Secretary to Government, Military Department.

By the author, through the Revd. Dr. Wilson.—Ultimi Progressi Della Geografia sunto letto alla sezione di Archeologia e Geografia della settima Italiana riunione degli scienziati ch'ebbe sede in Napoli nei Mesi di Settembre ed Ottobre del 1845.—Cenni Sull' Agricoltura e L'Industria dell' Africa Francese, e sulla condizione attuale delle sue Miniere Due Lezioni, dette nell' I.E.R. Accademia de Georgofili, Negli Anni 1844 e 1846.—Cenni Storici iponomici e statistici Sulla Miniera di Rame, detta La Cava di Caporciano, presso Montecatini nella Valle di Cecina, dettati dal Conte Cav. Dottore Jacopo Graberg da Hemso, &c. &c.

Letters.—From A. Malet, Esq., Chief Secretary to Government, Marine Department, No. 1660, dated the 19th November 1847, intimating that, as an experiment, Government is pleased to entrust to the Geographical Society the superintendence and printing of the Tidal Observations now in progress at Bombay and Aden, as well as those which may hereafter be instituted, and that references will be made to the Commissioner in Scinde in view to the establishment of observatories at Kurrachee, and to the Resident in Kutch for Mandavie ; also to the Political Agent in Kattywar, for Porebunder ; and to the Collector of Continental Customs, for Gogo or Perim Island, and Vingorla, &c. &c.

From Lieut. Col. P.M. Melvill, Secy. to Govt., Marine Department, No. 1822, dated the 10th Dec. 1847, forwarding copy of a communication from the Political Agent in Kattywar, expressing his belief that Porebunder is well adapted for the esatablishment of a Tidal and Meteorological Observatory, and that, as an officer is always stationed at that place, he would no doubt be happy to exercise a general superintendence over it.

Ditto ditto ditto, No. 1832, dated the 20th December 1847, forwarding copy of a communication from the Political Agent in Kutch, stating that no place appears to him to be more suitable for Meteorological Observations than the terraced roof of the palace at Mandavie, which His Highness the Rao has expressed his desire that Government would avail themselves of, or any other spot of ground near Mandavie.

From Lieut. Col. P. M. Melvill, Secretary to Government, Marine Department, No. 1921, dated the 24th December 1847, forwarding copy of a letter from the Officer commanding the Indus Flotilla, reporting that on the return of the "Kedjwarree," or other vessel, as guard ship, the Tidal and Meteorological Instruments can be kept on board that vessel, and the whole placed under the charge of the Master commanding, who, with the assistance of a writer on Rs. 30 per month, would, in his opinion, be able to carry out the objects in view.

From Messrs Remington & Co., dated the 10th December, 1847, inclosing a copy of the Society's account current with them, made up to the 31st July 1847, and exhibiting on that date a balance of Rupees 2797 : 5 : 8 in the Society's favor.

From H. B. Riddell, Esq., inclosing a Hoondee for Rs. 15, his subscription to the Society for the year 1847-48, and requesting that his name might be erased from the list of subscribers.

From W. Henderson, Esq., dated 30th December 1847, requesting that his name might be erased from the list of subscribers to the Society.

From Lieutenant Col. P. M. Melvill, Secretary to Government, Marine Department, No. 121, dated 27th January 1848, intimating that, as the tenor of the 3rd para. of the Society's letter No. 39, dated 22nd December last, does not accord with the report of the Government officers on Tidal and Meteorological Observations &c., an explanation on the subject has been called for from the proper quarter, and states that the resolution of Government to confide to the Geographical Society the superintendence and printing of the Tidal Observations applies to the future, not the past, and that as a suitable and convenient period for the Society to commence operations, the 1st January 1848 should be fixed upon. Further, that it is not the intention of Government to interfere with the publication of the observations that have already been taken, and for the printing of which instructions have been issued. The opinion of Government is also expressed that it would be most convenient for all parties for the Geographical Society to place itself in direct communication with the officer in charge of the Observatory, and with Captain Haines at Aden, who would be instructed to attend to the wishes of the Society in all matters relating to the observations.

From Lieut. Burke, Engineers, to Dr Buist, on the prevalence of Fibrous Gypsum all along the Indus around Hydrabad, and of Gypseous Alabaster in Nimaur. In Scinde, plaister-casting was perfectly understood, and resorted to for the construction of ornamental ventilators, fan-lights, and window-frames. The favourite forms were open trifoils and quatrefoils, such as are common in the screens of Gothic Churches. They were often beautifully executed, and to be had for extraordinarily low prices indeed. Gypsum was so plentiful that it was often made use of for mortar or a whitewash.

The Meeting then adjourned till the 28th February, 1848.

A SPECIAL General Meeting of the Members of this Society took place in their Rooms, Town Hall, on Saturday the 11th March, at half-past three o'clock P. M., in terms of the minute of the last Ordinary Quarterly Meeting held on the 3rd February, for the purpose of having laid before them the Report of the Sub-Committee on the subject of Tidal and Meteorological Observations, &c. &c.— The Honorable J. P. Willoughby, Esq., Vice President, in the chair. Present: The Hon'ble L. R. Reid, Esq.; Captain H. B. Lynch, I. N.; Commander C. W. Montriou, I. N.; Revd. Geo. Pigott; Major J. Holland; Lieut. Col. N. Campbell; Major G. LeGrand Jacob; Ali Mahomed Khan, Esq.; and Geo. Buist, Esq., LL.D., Secretary.

The following Report was then laid before the Meeting, and directed to be recorded as approved of:—

"REPORT.—The Report of the Sub-Committee appointed to report on the best mode of carrying out the plan now experimentally approved of by Government, and the expense which is likely to devolve on the Society.

"I.—The Committee resolved—That the Society ought not to encumber itself with any financial arrangements, or be called on to disburse money from its funds, on account of any part of the present scheme save that referring to the publication of the observations in its Transactions.

"II.—That the Committee recommend that each observatory be supplied with the following instruments—these to be of the best quality :—

1 Self-Registering Tide-Gauge.
1 Barometer.
1 Pair Self-Registering, and
1 Common, Thermometers.
1 Anemometer.
1 Rain-Gauge.

A Sextant, an Artificial Horizon, and a Pocket Chronometer, would be extremely serviceable. These could be procured from the stores of Government.

"III.—Aden Tidal Observations. The Committee recommend that both the Tide-Gauges at Aden should be placed under charge of Mr. Moyes, and worked uniformly; and that as it is important that the observations be reduced and presented to the public in the form most available for the use of scientific men, it be recommended to the Government to cause all the observations from all the stations to be transmitted to the Observatory, and forwarded from thence in a reduced form fit for publication to the Society."

A long discussion on the various subjects embraced in the report then ensued, from which it appeared that the Society were not disposed to bestow the sum of Rs. 3000, which would exhaust the entire balance in its hands, on the publication of this single scheme of research. It was explained that when the proposal was first made, the archives of the Society were almost emptied of papers; that they had reprinted one volume of their transactions, and passed another in an expensive form through the press, and had not in reality publishable matter enough at their disposal to exhaust their funds. Matters since then had changed, and they were at present so well supplied that it was difficult for them to overtake with sufficient celerity the publication of the papers at their disposal.—It was suggested by Major Holland, that, to meet the want of funds, the points of observations should for the present be restricted to four or five, including those already in existence.—Dr. Buist proposed that, as the paper for the tracing of the Tide-Gauges cost nearly a half of the whole sum named in the estimate, instead of the 300, fifty copies of them should be thrown off: this would at once reduce the estimate by about Rs. 1500. These papers were valuable as references merely, and such a number should only be printed as sufficed for some dozen or two of the members of the Society, and the learned men or bodies of men, who might desire to consult them.—The Hon'ble Mr Reid said that he did not see why the Society should be saddled with the expense of publication at all: if Government were to supply agents, observatories, and instruments,

there seemed no reason why they should not undertake the cost of printing. The Society's services as superintendents of the scheme would themselves be onerous and very valuable. Government had many months since received instructions from the Court of Directors to resume Tidal Observations, and only waited to see the result of the scheme proposed by the Society—it being in reality resolved that the charges should fall on the public treasury.—The Hon'ble Mr Willoughby said that it was to be regretted that this view of matters had not been taken from the first, and that the Society had not counted the cost before they had come forward with their plan. He should in that case in all likelihood have adopted the views of Mr Reid: he was now afraid that if the offer to publish were to be withdrawn by the Society, the superintendence might be withheld from them.—It was explained that it was only in July last that the Court of Directors had agreed, at the suggestion of the British Association, to resume Tidal Observations in India; that the intimation of their having done so reached the Society subsequent to the meeting in August, consequent on which the latest letter addressed to Government on the subject had been written. The resolution of the Court entirely altered the aspect of affairs, and made that imperative on the part of Government which before had been voluntary. Besides this, when Government, in 1845, adopted the scheme as suggested by the Society, they resolved that the results should appear in the report of the Observatory, and thus be published at the public charge: no more was now required of them than what they had formerly been willing to take upon themselves, the Society only desiring to be entrusted with the supervision of the execution of the scheme they had planned. All the resolutions previously proposed on this subject having been withdrawn, the following was proposed by Major LeG. Jacob, seconded by the Revd. Mr. Pigott, and agreed to unanimously;—

"Resolved—That the Secretary do communicate to Government the result of its enquiry into the expense of printing, which will simply for one year's observations at seven observatories cost 3,000 rupees—exceeding the balance in the Society's hands; and submit that it could not, even with this sacrifice of the whole of its funds, offer to continue its aid in printing beyond one year. Since it appears from the reports of the British Association—vide No. 1027 of the *Athenæum*—that the Government is already charged by the Hon'ble Court to make these observations, the Society trusts that the Government will undertake the expense of printing, the Society being prepared to carry out its original proposition of superintending the observations."

The following resolution was then recorded: it was agreed that the Admiralty should not be written to until the views of Government had been made known.

Proposed by Captain Lynch, and seconded by Major Jacob:—

"That should Government accede to the present arrangement, the Secretary be requested to place himself in communication with the Admiralty relating to the grant of £350 for the provision of instruments, &c."

A rough draft of the letter to Government was directed to be submitted before transmission, by the Secretary to the Committee. The meeting then adjourned till the 4th May, 1848.

THE Annual General Meeting of this Society took place in their Rooms, Town Hall, on the 4th May 1848, at 3 o'clock P. M.—Present: Captain H. B. Lynch, I.N., in the chair; Revd. Geo. Pigott; Major R. St. John; Dr. J. Glen; Captain H. J. Barr; S. S. Dickinson, Esq.; Commander C. W. Montriou, I. N.; and George Buist, Esq., LL.D., Secretary.

The absence of Mr. Willoughby, Vice-President, was explained to have arisen from the loss of a near relative.

Captain Lynch, senior member of Committee, was called to the chair.

The Minutes of the Meeting of the 3rd February, and Special Meeting of the 11th March, were read and approved of.

From the accounts of the Society laid before the Meeting, it appeared that there was a balance in the hands of the Treasurers in favour of the Society of Rs. 3,322: 5: 8.

The Revd. Geo. Pigott, Dr. J. Glen, and Major R. St. John, were appointed Auditors of the Accounts.

The following letters and donations were laid on the table:—

PAPERS.—By the Author.—Meteorological Returns and Diagrams, shewing the high and low water at Seerah, and state of the Atmosphere at Shum Shum, at Aden, for the months of February and March 1848. By Sergeant W. Moyes —with a letter.

BOOK.—By Government.—Report, by Captain G. Wingate, Superintendent of the Revenue Survey in the Southern Mahratta Country, on the Survey and Assessment of the Bunkapoor Talooka in the Dharwar Zilla. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated the 17th April, No. 1336 of 1848.

LETTERS.—From Lieut. Col. P. M. Melvill, Secretary to Government, Marine Department, No. 193, of the 5th February 1848, transmitting copy of a Communication from the Collector of Continental Customs and Excise, together with copies of letters to that gentleman's address from Messrs Jones and Payne, the Deputy and Assistant Collectors, relative to the proposed establishment of Tidal Observations at Gogo and Vingorla.

From A. Malet, Esq., Chief Secretary to Government, Marine Department, No. 489, of 23d March 1848, transmitting copy of a communication from Captain Haines, Political Agent at Aden, respecting the Tidal and Meteorological Observations kept at that place by Mr. Moyes.

From the Secretary to Government, General Department, No. 1176, of 1848.

From Assistant-Surgeon John Drever, dated Kurnool, the 10th March 1848, enclosing an order for Rupees 15, being his subscription to the Society for the official year 1847-48, at the expiration of which period he requests his name might be erased from the list of subscribers.

From C. G. E. Ford, Esq, dated Hoshungabad, the 12th April 1848, expressing his thanks for the Secretary's offer to propose him as a member of the Society, and transmitting at the same time a hoondee for rupees 15, as his subscription in advance.

From Captain T. G. Carless, I. N., dated the 7th April 1848, requesting that C. M. Harrison, Esq., Civil Service, might be proposed as a member of the Society.

From Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden, dated the 16th April 1848, requesting, at the expressed wish of Captain S. B. Haines, Political Agent at Aden, that that gentlemen might be proposed as a member of the Society.

From Mr. Moyes, dated Aden, the 30th January 1848, transmitting two months' Tidal observations taken by him at Aden, and enumerating the number and description of the several instruments under his charge at that place.

From H. B. Hinton, Esq., Garrison Assistant-Surgeon at Delhi, dated the 19th February 1848, requesting that as it has come to his knowledge that the Geographical Society presents copies of its Transactions to public libraries, a copy might be kindly furnished to the Delhi Government College Library, for reference on scientific subjects.

From John Shillinglaw, Esq., dated 3 Waterloo Place, London, forwarding a prospectus of an Agency, for transmitting, with expedition and certainty, all such numbers of the transactions, journals, &c. &c., of our numerous Scientific and Literary Societies, Associations, Institutes, &c., that are destined for Societies abroad, and requesting to sign the accompanying formula if the assent of the Geographical Society can be procured.

From Lieut. Col. P. M. Melvill, Secretary to Government, dated 3rd May 1848, No. 725, Marine Department, acknowledging the receipt of the Society's letter, with enclosures, dated the 4th ultimo, and stating, for the information of the Geographical Society, that the Right Honorable the Governor in Council will undertake the expense of printing the Tidal and Meteorological observations, leaving the supervision in the hands of the Society, as an experimental arrangement.

The following gentloman were then elected Members of the Society :—

1st. C. M. Harrison, Esq., Bombay Civil service—proposed by Captain T. G. Carless, I. N., and seconded by Dr. J. Glen.

2nd. Dr. C. G. E. Ford—proposed by Geo. Buist, Esq., LL.D., Secretary, and seconded by Captain H. B. Lynch, I. N.

3rd. Captain S. B. Haines, I. N.—proposed by Lieut. C. J. Cruttenden, I. N., and seconded by Captain H. B. Lynch, I. N.

4th. Dr. E. Impey—proposed by Dr Geo. Buist, L.L.D., and seconded by Captain H. B. Lynch, I. N.

5th. Lieut. E. F. T. Fergusson, I. N.—proposed by Commander C. W. Montriou, I. N., and seconded by Captain H. B. Lynch, I. N.

The Secretary stated that, in compliance with the custom of the Society, he had prepared a paper on the History of Geographical Research in the East for the past three years; but that it was not quite in such a shape that it could be read before the meeting. It was directed to be submitted to the Committee for publication.—A collection of specimens made by the officers of the steamer *Conqueror* was laid on the table of the Society; with a very interesting letter from Dr Fleming, of the Bengal service, on the coal and salt formations on the upper Indus.

Dr. Fleming stated that his communication was not meant to be made public, as he must first report the result of his enquiries to his own Government. The Secretary said, that he merely wished to call the Society's attention to these subjects, seeing that unless they were speedily put in possession of Captain Christopher's observations, their Bengal friends would be before them.—Some conversation took place in reference to the use of the mountain sympiesometer as an instrument for determining altitudes, and a large mass of observations with the sympiesometer and standard barometer simultaneously, shewing how closely the two agreed with each other, was also laid before the meeting. The conclusion come to was, that it would on the whole be preferable to take the risks the barometer was liable to, than to resort to the sympiesometer.—Some specimens of cloth dyed in the upper country by Drs Dempster and Fleming with native cochineal, were laid on the table, and greatly admired by the Society.

Mr Pigott recommended that the Books in the Library be allowed to be taken out, as in the case of the Asiatic Society, in place of being reserved for consultation, as at present; as this would be of great advantage to gentlemen much absent from the presidency, and who were deterred by the expense from subscribing to the Asiatic Society. This was agreed to, and Mr Pigott was requested to draw up a set of regulations for the management of the Library, to which it was hoped important additions would be speedily made.

The letter from Government agreeing to take upon themselves the entire expense of the Tidal and Meteorological Observations suggested by the Society, in the hands of which the supervision of the scheme would still remain, the following gentlemen were appointed to act as a Sub-Committee, for the further working out of the scheme.

The Deputy-Quarter-Master-General, the Deputy-Superintendent of the Indian Navy, the Superintendent of the Observatory, and the Secretary of the Society. The first-named gentleman to be Chairman and Convener.

It was then proposed by Mr Pigott, seconded by Captain Lynch, and agreed to unanimously—"That in consideration of the large amount of interesting subjects continually being brought before them, the Society do hereafter meet on the *second* Thursday of every month, at 3 o'clock precisely, instead of quarterly, as heretofore."

The following gentlemen were declared Office-bearers for the year:—

Three Vice-Presidents.

1. The Hon'ble J. P. Willoughby, Esq.
2. The Hon'ble L. R. Reid, Esq.
3. Commodore Sir R. Oliver, Kt., R.N.

Twelve Resident Members.

1. Captain H. B. Lynch, I. N.
2. Lieut. Col. P. M. Melvill.
3. C. J. Erskine, Esq.
4. Major J. Holland.
5. Lieut. Col. N. Campbell.
6. Dr. J. McLennan.

7. Captain H. J. Barr.
8. Commander C. W. Montriou, I. N.
9. Commander G. Jenkins, I. N.
10. Dr. J. Glen.
11. Dr. C. Morehead.
12. S. S. Dickinson, Esq.

Eight Non-Resident Members.

1. Major H. C. Rawlinson.
2. Major Sir W. C. Harris, Kt.
3. Captain E. P. DelHoste.
4. Major G. LeG. Jacob.
5. Captain T. G. Carless, I. N.
6. Captain G. Fulljames.
7. Lieut. C. J. Cruttenden, I. N.
8. Dr. J. Burnes, K. H.

Dr. Buist, in laying a very large collection of specimens before the Society, called their attention to an Economic Museum proposed at the suggestion of the Hon'ble Mr. Clerk to be brought into existence. The following was shortly stated to be the objects of the scheme :—

"MEMORANDUM ON THE SUBJECT OF THE ESTABLISHMENT OF AN "ECONOMIC MUSEUM AT BOMBAY.

"The Museum is intended to afford a repository for every variety of Raw Material,—animal, vegetable, and mineral,—which the East supplies, used as food, medicine, or clothing, or convertible, by the application of human industry, into anything that becomes subject of merchandize : of all tools, instruments, machines, and implements, made use of in the process of transformation, and of the manufactures themselves which are the result.

"The articles will be arranged under a double system of classification, the first referring to the locality from which they are obtained, the second referring to their characters.

"To give an example : the imports from China, which appear to be amongst the most varied the bazaar supplies, will first be placed under one general division, entitled Chinese productions, and will be ranged somewhat thus :—

"POTTERY.—Porcelain, earthenware coarse and fine, bricks, tiles, kaolin, clay glaze, moulds, potter's wheel and tools, lacquered goods, fans, paints, vermilion, red lead, cobalt. Chemical substances: corrosive sublimate, sal-ammoniac. Arms, attire, umbrellas, agricultural implements, and so forth.

"These again will be classed with earths, pottery, and porcelain-ware generally; with gums, minerals, and dyes, classed scientifically.

"Each specimen will be labelled or ticketed, the ticket not giving the name or habitat merely, but the uses made of it, the process of extraction or of manufacture, the extent to which it is in demand, and price it fetches in the market, with every other matter known regarding it which may be of interest or of use.

"Tools and implements will under the second system of classification be arranged somewhat say as follows :—

" Potter's Tools.

English.	Chinese.	Indian.	Egyptian.
Potter's Wheel.	Potter's Wheel.	Potter's Wheel.	Potter's Wheel.
Pug Mill.	None.	None.	None.
Brick-making Machine.....	"	"	"
Brick-compressing Machine.....	"	"	"
Tile and Brick Machine.....	Brick Moulds.	Brick Moulds.	Brick Moulds.

" Peculiarities of the different kinds of tools will thus be shown, with hybrids manufactured from various patterns to meet circumstances.

" These will again appear in duplicate under the heads China, India, and Egypt. There will be no special English head.

" Gums will appear under the general division resins and gums, and under the topographical class; so with ores, minerals, and all other materials.

" By this means a stranger in Bombay will discover at a glance the whole contents of our bazaars, find directions where and how to procure them, and be able in a few hours to acquire all the information regarding them that can be obtained. They will see what are the products of other countries, and may, if proceeding thither, be made aware at a glance of all that is known regarding them at Bombay; and from this determine the facts on which we are ignorant, in reference to which enquiries will be most important.

" While these things may be allowed by the Geographical Section of the arrangement, by their classified division a short system of study may be carried on, and the Geologist and Mineralogist in particular will find one set of cabinets and tables arranged with the strictest regard to the system of the text-books and manuals.

" Reports will be published periodically as they are found to be required, or as the state of finances will allow. To avoid, however, the enormous expenditure printing so often occasions, the information desired to be disseminated will be put in as pleasing a form as possible, so as to become desirable to the general reader, in hope that it may find a place in the newspapers free of charge. When further elaborated, it is believed it will be found eminently acceptable as forming a part of the reports of the Chamber of Commerce, or of the almanacs or other periodicals issued from the local press. By degrees, something like an addition to the Oriental department of a dictionary of arts and manufactures may possibly be aspired to. A reference to the Encyclopædia Britannica, to Ure's Dictionary of Arts and Manufactures, McCulloch's Dictionary of Commerce, Loudon's various Encyclopædias, with the Pharmacopœas, and Materia Medicas of England, of Bengal, and Madras, will show the reader how vast is the amount of our ignorance on points on which enlightenment is eminently desirable; while the two or three notices subjoined to this will give him some idea of the amount of invaluable and perfectly attainable information to be picked up in the bazaar."

The Society declared its entire approval of the scheme, and its anxiety to advance it by every means in its power.

The attention of the Society was then called by the Secretary to the fact that they themselves had at one time possessed a considerable collection of specimens,

which it had been deemed advisable to make over to the Asiatic Society. That of late many papers had been received by them, and several others were expected, where specimens formed very important illustrations of the matter discussed. It was resolved upon this, that the Society should resume the formation of a collection of all sorts of specimens illustrative of their proceedings.

The request of the Assistant Garrison Surgeon at Delhi, for copies of their Transactions for the Government College Library, was complied with.

The Sanatarium of the Indian Navy was directed to be provided with a copy of the Transactions of the Society; as were also the other Libraries in Bombay.

The Transactions just passed through the press were laid on the table of the Society for distribution.

The Society then adjourned to the *second* Thursday of June.

After the General Meeting had adjourned, the Special Committee met to make arrangements for the Tidal and Meteorological Observations. The Secretary was directed to draw up letters to the Admiralty and to the Government, and submit the drafts to the Committee.

THE Monthly Meeting of this Society took place in their Rooms, Town Hall, on Thursday the 8th June, 1848, at 3 o'clock P. M. This was the first occasion on which the Society had met under the new arrangement by which meetings are to be held twelve instead of four times a year, and on the same day with those of the Asiatic Society.

The following gentlemen were present :—Dr J. McLennan; the Hon'ble J. P. Willoughby, Esq.; Captain H. J. Barr; The Revd. Geo. Pigott; Major J. Holland; Dr J. Glen; Manockjee Cursetjee, Esq.; S. S. Dickinson, Esq.; and Dr Geo. Buist, Secretary. In absence of the President and Vice-Presidents, Dr. McLennan was called to the Chair, which was afterwards occupied by the Hon'ble Mr Willoughby, Vice-President.

The Minutes of the Anniversary Meeting, held on the 4th May last, were read and approved of.

The Revd. Mr Pigott gave in the report he had been appointed to draw up as to the Regulations requisite for conducting the Library of the Society on the new principles formerly submitted, that of a Library, not of consultation purely, as heretofore, but from which books might on certain conditions be taken out by subscribers. This was especially meant for the accommodation of Junior Officers of the Military, but more particularly of the Naval, service, whose limited incomes and frequent absence from the presidency made them averse to join the Asiatic Society, the annual subscription of which (Rs. 100) was upwards of six times that of the Geographical Society (Rs. 15). The young men of the Indian Navy, in particular, would find the Library especially convenient for them, as consisting chiefly of works of voyages, travels, and other matters bearing on their profession. The report was read, and the thanks of the Society voted to Mr Pigott. It was then resolved that the Regulations of the Society should be revised and printed,

and the rules referring to the library, as well as a catalogue of the books, charts, and maps, published along with it.—Mr Pigott stated that it would be desirable to make the maps, drawings, and manuscript papers, of the Society, accessible to the members within a limited period of their being given in.—It was explained that the papers of the Society, unless when in the hands of the printer, were at all times accessible, within the rooms, to all the members of the Society, and that they might be consulted by any stranger on an order from the Secretary.

It was moved by Mr Pigott, seconded by Dr Buist, and agreed to unanimously, that hereafter each member should be entitled to give an order to a friend, or to bring one along with him to the ordinary meetings of the Society; and that this, together with the regulation in reference to the library, should become one of their rules for the future.

The Secretary reported, on behalf of the Committee on the Scheme of Tidal and Meteorological Observations, that they had met immediately after their appointment, and directed the Secretary to draw up a letter of thanks to the Government, and a letter renewing their intercourse with Her Majesty's Lords of the Admiralty. Pressure of business had prevented the Committee's instructions from being attended to, but they would now be carried into effect without loss of time.

In reference to the letter of Mr Lumsden on the subject of the Statistical information desired by the Hon'ble the Court of Directors, the Secretary was desired to write to Government, stating that the Society had, on receiving the first communication on the subject, specially directed the attention of their members to the enquiries desired by the Court to be replied to, but that no answer had hitherto been sent in; that though the Society were deeply impressed with the importance of the information the Court desired to be collected, they had at no time been sanguine of obtaining it by the methods recommended for the purpose.

It was moved by Mr Pigott, and agreed to unanimously—That the Right Hon'ble the Governor be requested to become the Patron of the Society, in the room of the late Governor Sir George Clerk.

From the appearance of the Society's tables it might have been supposed that a party of Geologists rather than of Geographers were about to discuss the materials forming the crust of the earth, rather than the geographical features of its surface. For conciseness sake we shall depart a little from the strict order of the proceedings of the Society, commencing with an account of the specimens on the table: the largest suit was that presented by Lieut. Christopher as part of the fruits of his voyage up the Indus.

1.—*Salt.*—This seems to be the same variety of the mineral sent in large quantities to Bombay some years ago by Runjeet Singh. The specimens were of three sorts—1st—large parallelopepids, about the size and form of English bricks, ten inches by five by three, or thereby, the surfaces perfectly smooth and lustrous, the salt itself semi-transparent. Its dryness even at this season bore evidence of its purity,—the muriates of magnesia and lime, which form the most objectionable contaminations of sea salt, being what chiefly occasion its deliquescence. All the

specimens were slightly tinted with red. This, as has been shewn by Dr Giraud,* is due to the presence of the exuviæ of marine animalcules—a fact first adverted to by Ehrenberg. Along with these specimens, taken from the interior of the rock, were several large masses broken from the surface, and deeply traced with strange fantastical grooves or erosions, occasioned by small streams of running water. One of the results of these erosions as the water dried up, and the heats set in, were some beautiful snow-white stalactites of salt, often found many feet in length : they were occasioned by the slow dropping of the water which had trickled through the grooves in the preceding specimens until charged to saturation, when they hardened as they trickled down. Some finely carved vessels, cut from granular rock salt of a different structure, were also shewn.

2.—*Limestone.*—The most interesting of these were specimens from the neighbourhood of the coal. They were of a brownish or greyish colour, slightly crystallized. One of the specimens was full of encrenites—others abounded in shells of the producta and spirifera class. Corralines and madrepores, such as those found in the Scinde nummuliferous limestone, prevailed in others.

3.—Specimens of *Alum stone* or *shale*, in various states of decomposition : some of them calcined preparatory to the extraction of the sulphate of alumina.—The specimens, both raw and calcined, exactly resembled those made use of near Whitby in Yorkshire, and Hurlet near Glasgow, for the manufacture of alum. Captain Christopher did not explain the manner in which it was made, and we are equally unacquainted with the processes resorted to in Cutch Bhooj, from which northern India is supplied with alum, as with that resorted to on the Upper Indus. At home, alum is either manufactured from alum stone or alum shale. The former is a mineral of somewhat rare occurrence : it is roasted or calcined at a very moderate temperature in common lime-kilns: it is then exposed to the weather : the alum is now washed out, and the solution crystallized ; and with this the operation concludes. Alum is obtained from shale by first roasting it in heaps, then exposing it to the air, which dissolves the sulphate of alumina : potash or ammonia is added to the solution to obtain the triple salt, which in all cases consists either of sulphate of potass 18·34, sulphate of alumina 36·20, and water 45·46 ; or of sulphate of ammonia 14·48, surphate of alumina 36·64, water 48·48.

4.—*Sand containing Gold.*—Of this an account is given by Dr Fleming in a note, adverted to at last meeting of the Society :—

"From Lahore I marched up to Pind Dadud Khan and while there, examined the range for several miles East and West of that place, including the salt mines, coal seams, &c. From thence I crossed the hills to Kuttass, and have, by moderate marches, come down the north side of the range, and am now on my way to Kalibag, on the Indus, and within two marches of it. The weather has been very hot, and is becoming day by day more so, but notwithstanding, I have managed to see a good deal, and to obtain a considerable amount of valuable information ; and none to me of greater interest than the occurrence of numerous fos-

* Transactions of the Bombay Branch Royal Asiatic Society. Dr Giraud states that the red colour, which he supposed at first due to the cause assumed, arises from particles of silecite of iron : the salt abounds with infusoriæ, but they are nearly colourless.

sils in marls, and siliceous limestone, of a light pure color, full of flints, resembling those of the chalk formation. These fossiliferous strata form the highest part of the southern steep escarpment of the range, and occupy in perpendicular height a space of at least 300 feet. In the marls which occur at the lower part of this deposit, a series of bituminous shales are developed, full of large crystals of gypsum and iron pyrites, in which occurs the coal seam, which varies from five feet to a few inches. This carboniferous deposit appears to occur in the same position through the whole of that part of the salt range west of Baghanwalla which we have examined,—the coal at various points presenting a singular uniformity in appearance, being of a dull black color, with a brown streak, brittle, and containing nests of half decomposed brown vegetable matter, and small crystals of gypsum. Its surface is here and there encrusted with a yellow iron alum—no doubt the result of the reaction of the iron pyrites on the aluminous earths of the shales. Beneath the carboniferous deposit and marl follows a succession of sandstones, conglomerates, and indurated clays, generally of a blood-red colour, beneath which occur the saliferous brick-red marls abounding in large angular masses of saccharine gypsum, and the extensive deposits of rock salt—the chief source of the wealth of this part of the Punjaub. This salt marl appears to rest on a brownish sandstone and conglomerates of the primitive rocks, none of which appear in situ in this district. In the variegated sandstones below the carboniferous strata, so to speak, vegetable impressions similar to those of Fuci were observed, associated with ripple marks, but no other organic remains could be discovered. In the coal shales no organisms could be found, these being accumulated in greatest abundance in a limestone, almost formed of the debris of shells, immediately above the marl, and gradually passing into the siliceous flint limestone, which in some places is literally composed of small-chambered shells resembling nummulites. We are inclined to believe that the coal deposit is of more recent date than that of the variegated sandstones on which it rests, and is either a miniature representative of the oliate formation, or a member of the chalk, to which probably the siliceous limestone belongs, though in some characters it resembles strata of more recent date. This limestone dips with the inferior strata to the North West at a considerable angle, its northern slopes presenting a series of well cultivated valleys, abundantly supplied with sweet water, which on the southern escarpment of the range is very scarce, and when it does occurs is generally a perfect brine. Towards the base of the northern slope of range, a series of soft friable sandstones, of a greyish color, interlaminated with red and blue clays, make their appearance, and dip towards the extensive plain intervening below the salt range and the Hazara country. These sandstones are of a remarkably soft character, and rather deserve the name of indurated sand, cemented together by calcareous matter, which towards the inferior part of the series occurs in such quantity as to form a coarse limestone. Among the sandstone strata, patches of conglomerates of small pebbles here and there occur, the pebbles being in many instances composed of the flinty limestone on which these softer and more recent strata rest. In all the nullahs in this district which flow through these sandstone strata, gold is found, and washed from the sands produced by their disintegration,—the villages of Tilleh, Tamun, and Mohhudd, being famous for the amount of gold yielded by the sands in their neighbourhood. Such is a brief outline of the geology of the salt range, written

hurriedly at a temperature of 96° in my tent—a temperature which renders breaking stones a work of rather a severe kind. We have, however, made a good collection, and among our fossils can number at least twelve species of mollusca, two of echinodermata, and one tooth—probably that of a shark. That the coal is a lignite, I have not the slightest doubt; but as it is one of good quality, will be highly useful if found in a locality where it can be easily worked.

"From the immense deposit of rock above the coal seam, sinking a shaft would be a work of great expense, and were the course of the seam as it dips to the North West at an angle of from 40° to 50°, to be worked, beginning at the surface, there would be a continual annoyance from the rolling down into the pit or excavations of the immense deposit of fragments of rock superior to the coal seam on the sides of the mountain or hill. From the foot of the salt range, the Jhelum is only some four or five miles distant, where boats can be had in any number for conveying the coal to distant parts." *

The outbreak at Mooltan occasioned the recall of Dr Fleming when in the midst of his investigations. The following extract from a letter written by him on his return to Lahore gives the conclusion of his observations for the present. Next year it is to be hoped he will renew his labours :—

"I have been along the whole of the Range from Kalibag to Pind Dadud Khan, and have been much pleased with the trip. At Kalibag I examined the Coal there, and the bituminous shales which when burnt yield the alum of the N.W. Provinces. I also got a number of fossils,—ammonites, belimmites, echinidæ, several specis of terbratula and productas, all of which bear a strong resemblance to

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* Gentlemen travelling in India find so much difficulty in resorting to libraries, or in carrying books of reference along with them, that writers on subjects which have been written on before are exposed to every species of disadvantage. Subjoined is a lengthened extract from an excellent paper, by Dr Jameson, on the Coal, Salt, and other Minerals, of the district surveyed by Lieutenant Christopher, which the latter officer does not appear to have ever seen : above we have given some extracts from a letter from Dr Fleming, lately dispatched by the Supreme Government to examine the coal at Kalabagh. On most points both agree very closely with each other, in so much as to leave no doubt as to the formations being those of the magnesian limestone and new red sandstone. Mr Lyell mentions that the producta sperifera and encrenites are found in the magnesian limestone, but not higher; and to this doubtless the specimens of Lieutenant Christopher belong. Dr Jameson's suggestions as to the use of gypsum, have not been acted on, but gypsum has very recently been made use of in Bombay for the purposes of plaister casting, and doubtless will be so by and bye for cornices and ornaments of ceilings. It can be had in abundance from Scinde, China, or the Persian Gulf, for from Rs. 4 to Rs. 8 per ton—much cheaper than the cost of carriage from Kalabagh. Gypsum does not fall to powder when burnt, but requires considerable labour in grinding it : its use seems to have been long known in Scinde, though apparently unknown in India :—

[FROM THE JOURNAL OF THE ASIATIC SOCIETY OF BENGAL, NO. CXXXV., 1843.]

Salt Range.—From Jalalpore, the salt range extends in a N. W. by W. direction on to Maree on the Indus, when it crosses the river, and can be traced from thence onwards to the Khyber or Teera mountains. From it various secondary branches proceed, as one to the N., where it is met with in the neighbourhood of Rotas, and on which the fort of that name is built, forming the Tillah hills of Elphinstone; it extends for a short distance Northward, and probably then makes a bend to the Eastward. All these ranges join the low group of hills to the North-east, but none of them cross the Jelum below the town of Jelum. These, however, cross there, and run on by Bimber, Jummoo, Nurpoor, and down by the South of Belaspore, crossing the Jumna at Fyzabad, and the Ganges at Hurdwar * The whole course from Jelum is as near South-east as possible, like all the other secondary ranges of the Himalayas.† The salt range is parallel to the central or high mountain range.

* Journal of the Asiatic Society.

† Elphinstone's Cabul, vol. II., p. 407.

those of the chalk. I see in your paper of the 17th, which I this morning received, a notice of Dr Giraud's examination of the jet from Kalibag, which is a richly bituminous coal, as was to be expected. In my diary, which is now in the hands of Government, I mentioned this coal as being jet of fine quality, but have not yet had leisure to analyse my specimens. It is perfectly different from the principal coal deposit of the salt range, and occurs in white sandstone and shales among the variegated sandstones above the salt, in masses resembling trunks of trees, presenting in their interior in many instances portions of brown soft half decomposed vegetable matter. The jet is of fine quality, but does not occur in quantity—at least near Kalibag, to render it useful as a fuel. Captain Christopher also took down with him a quantity of highly bituminous shale as fuel, which occurs in connexion with the jet deposit; but I fear Dr Giraud will find in it a little more than 3·2 per cent of ashes, which he states as the amount in Kalibag jet. I think I mentioned in my letter to you that jet of a similar character occurs in small quantity in the soft tertiary sandstones at Kuhar on the N. side of the Salt Range. The regular Lignite seams are deficient at Kalibag, their place being supplied by an extensive developement of bituminous shale containing mere films of coal, rendering it admirably adapted for alum manufacture. In the Salt Range to the east of the Indus, where the Lignite seams are much developed, the alum shales are deficient, and vice versa. These shales at Kalibag are highly pyritous, and in some places to such an extent as to have caused the spontaneous combustion of the shales, in consequence of the oxidation of the bisulphuret of iron. At one place the combustion of the shale is so active that from the mouth of one of the old shafts from which the shale is excavated, there is a constant discharge of smoke, resembling that from the funnel of a steamer. In this shaft the combustion has gone on for five

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Rocks.—The rocks met with at Jelalpore consist of—

1. Limestone,
2. Sandstone,
3. Sandstone Conglomerate,
4. Red and green Marls,
5. Gypsum,
6. Conglomerate.

Conglomerate.—Resting upon the five rocks mentioned, in an unconformable position, there is a conglomerate, held together partly by calcareous, and partly by siliceous matter; in it occur rounded masses or boulders of granite, syenite, trap, quartz rock, and limestone, &c., the last of which abounds with organic remains. We met with this rock in situ some miles to the Westward, and on the road leading to Kalabagh, as well as at that place, it points out the direction followed by the stream which deposited the conglomerate.

Limestone.—It is very compact, and varies in colour from greyish white to greyish black, it is devoid of organic remains, and forms the highest parts of the mountains, rising to a height of about 1500 feet above the river Jehlum.

Sandstone Conglomerate.—The town of Jelalpore is built on the inclined sandstone conglomerate strata, and principally of that rock. It has a very pretty appearance, the houses being neatly arranged in a niche of the mountains, and about sixty feet up the acclivity: the name dates back to the time of Jehangeer, at which period it was large and populous;—the ruins, now seen about two hundred feet above the present site, testify to the accuracy of the statement. It was destroyed by Runjeet Singh about the commencement of his career, it being then principally inhabited by Mussulmans. Hindoos now form the bulk of the population On the hill overlooking it are the ruins of an old fort, which appears to have been almost entirely built of boulders.

All the rocks, with the exception of the conglomerate mentioned, are highly inclined, the angle varying from 35° to 60°; there is no uniform direction, as they dip N. E. and W.; nor is there any plutonian rock seen to account for this extraordinary arrangement.

Gypsum—Economical Uses.—The gypsum occurs imbedded in the red and green marls, its color being either white, rose, or brick red; from this place to the river, which is only distant half coss, masses of any size might be carried, and it is found here equal to the finest gypseous alabaster of the European continent; it is of this substance that the beautiful groups of small white figures and vases imported from Italy are made. The celebrated plaster of Paris is procured by exposing this rock to heat, which deprives it of its water of crystallization—it then falls to the state of a white powder, which has a strong affinity for water. Captain Franklin, speaking

years, and no means have been taken to put a stop to the destruction of the shales. Petroleum occurs in several localities around Kalibag, and is commonly known under the name of " gunduk ka tell," being used in place of oil by the poorer natives. It probably owes its origin to the destructive distillation of the bituminous shale strata which everywhere abound.

" It will be curious if the Nummulite Limestone of the Salt Range is identical with that of the Hala Range, described by Grant and Vicary, the latter of whom has been doing great things I hear at Subathoo in the way of discovering Saurian remains and molluscæ in a nummulitic limestone which occurs there—at least so Falconer writes me from Calcutta."

5—*Coal.*—The Coal on the Indus was of several varieties : some of Mr. Christopher's specimens were very heavy, and resembled the black band iron stones of the midland counties of Scotland : others were not unlike the cannel or porrat coal from which gas was made : others again resembling the lignite or brown coal of Bovey, or the jet of Whitby, or a variety intermediate between the two. Dr. Giraud had found the last mentioned of the specimens to contain a larger quantity of combustible gaseous matters than any mentioned by English Geologists, yielding 307·9 inches of rich carburetted gas per cent.—It yields on combustion 32 of earthy matter, 600 of gas, and 368 of solid carbon.

Specimens of *Wool* were also laid on the tables of the Society by Captain Christopher. A letter relative thereto explained the qualities and prices of the wool, and the districts where it was produced. The Secretary laid on the table along with these a pocket-book of specimens of wool from all parts of India and Central Asia, with descriptive memoir of quality and prices, by Mr J. Southey, of London. It had been prepared for the late Captain Connolly in February 1839,

about this rock, as found among the Himalayas, says—" It is probable that its chief use in Bengal for some time, would be as convertible into plaster of Paris, and affording a material for cornices and ornamental work, to the banishment of the very rude productions of this kind that we have hitherto put up with." There is *perhaps a sufficient quantity of it* to answer any demand likely immediately to arise. When the Government House was last repaired, it was considered desirable to obtain a sufficiency for the purpose above-mentioned ; but the fact of its occurrence within our own mountain provinces was not known at that time ;—*as it is within fifty or sixty miles of water carriage, it might be expected to pay for its transport.* In addition to its value in the arts, it forms an excellent manure, and could be applied with great advantage to many of the soils in the Punjaub. To the natives its uses are quite unknown ; but when it is appreciated, or rather when the country falls into the hands of a Government which knows its value, we may venture to predict, from its occurring in such vast quantity close to the banks of the river, that it will form a valuable article of exportation to Bombay, &c., or even now, as, by the excellent arrangements made with the Lahore Government by Mr Clerk, it is not liable to duty. To the Bombay Government, therefore, the gypsum is well worthy of attention, seeing that it might be most advantageously used in the public buildings, in making the ornamental works, and for many other purposes ; and it would, as Captain Franklin remarks, afford the proper material for making cornices, to the exclusion of the rude articles now in use. The experiment is well worthy of a trial, whether executed by Government or by private means ; if by the latter, and encouraged, it would no doubt yield a good return.

Proceeding along the hills in a W. by N. direction, we reached the village of Aaganwallah, distant about four coss. The inhabitants are principally Awans ; * we ought rather to say *were*, seeing that it is almost entirely deserted, owing to the rapacity of Raja Goolab Singh's soldiery. To reach the village we proceeded up the banks of a small ravine, and, as we approached its vicinity, we found the road paved with rounded boulders, which are strewed over the whole country. On the hill above them is a fort garrisoned by 200 of the Jummoo troops.

Gypsum in enormous beds of thirteen feet in thickness and upwards is here met with ; and associated with it the pure crystaline variety, named selenite.

Jutaneh Salt Mines.—A few miles further to the W. and by N. is the village of Kewal, where we pitched our camp, and proceeded to examine the salt mines of Jutaneh, distant about four

* The Awans, according to Elphinstone, belong to the class of Hindkees ; they form nearly the whole population of the country on the East side of the Indus to the South of Attock. Some part of the country is occupied by the Kuttuks and Bauricks.

but had never reached its destination. Such collections as these, with the English prices and uses annexed, furnished to the collector a very valuable help in his enquiries. The pocket-book and specimens in question now belonged to the economic museum. Mr Southey has very lately put a large body of information on these points before the world, in the shape of a published volume on the wools of India and Australia.

The next specimens were those presented by Captain Del Hoste, illustrative of the geology betwixt Viziadroog and the upper part of the Phoonda Ghaut. They consisted mostly of trapean rocks, and minerals—the argillaceous schist itself appearing to have suffered from volcanic agency. There was one fine specimen of iron ore, of the kind usually found associated with laterite. The vessels made of pot stone were well finished, and exhibited very creditable workmanship. They were famed for their strength and imperviousness to water: they improved both in hardness and toughness by use; they cost from a few pice to two or three annas each. The mineral from which they are formed appears to be the common pot-stone of the European geologist—a variety of compact talc usually found along with serpentine. It is mentioned by Pliny as used for the manufacture of domestic utensils two thousand years ago. The specimen believed by Captain Del Hoste to be granite, is either a siliceous conglomerate, or a grey variety of the silurcanian series of rocks; and with these, serpentine is frequently found associated. From the aspect of the specimens, little hope of discovering any considerable mass of sedimentary rocks betwixt the sea and the summit of the ghaut would appear to be held out. The notes of Captain Del Hoste and Captain Christopher indicate the importance of collections for reference purposes being made at the presidency, either as subjects of common examination and research, or for the use of those desirous of being possessed of them.

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coss. The road lies along the base of the mountains, and abounds with ravines. On the acclivity is seen the pretty village of that name, surrounded by palm trees; it is the residence of the miners, and contains about two hundred inhabitants. The mines, however, are about two miles further on, but beyond this all the water is either salt or brackish, and, to reach them, we proceeded up the bed of a small nullah, by the action of the stream of which the strata have been well exposed. The mines, three in number, are about forty-five feet above the bed of the stream, and have been opened 20, 30, and 35 years respectively; the shafts are about six feet in height and three in breadth, varying in length from 140 to 180 yards, and sunk through the red marl, in which rock the rock salt occurs imbedded. It also contains large imbedded masses of gypsum, which in many places are highly polished by the mere friction of the miners' bodies in passing and repassing. The descent is down a gradually inclined plane till we reach the principal bed, when we descend into the body of the mine by steps cut in the salt. Before arriving at the principal bed of salt, however, we pass several smaller ones, varying from three to six feet in thickness: the largest, the one now worked, is from 170 to 200 feet.

Mines.—The dress of the miner consists of a small place of dirty white cotton cloth wrapped round the middle of the body, a similar piece round the head; and, to protect his shins from the splinters of rock salt, a thick pad of black woollen cloth is worn. His tools are few in number and of a simple nature; viz, a large hammer, sharp pointed at one end and flattened at the other, chisels, and handspike; with these, he removes masses varying in weight from three to four pucka maunds (240 to 320 lbs), two of which are a camel load. Smaller masses are also removed to load oxen, &c. In removing the large masses, accidents, owing to the narrowness of the shafts, frequently occur. To light up the mine, small oil lamps are used, appended to which are long hooks, in order to fasten them to any projecting piece of rock salt. The miner is capable of removing from situ eight pucka maunds per diem, for which he receives an anna per maund, but he supplies himself with tools and oil, which cost four annas. On carrying the salt out of the mine, an additional two annas is given; this however is the work of another individual, who is capable of removing sixteen maunds per diem. By camels, bullocks, &c, the salt is conveyed to Pind Dadur Khan, (as no salt is allowed to be sold at the mines,) and there sold at the rate of a rupee per pucka maund. When the Maharajah Runjeet Sing held the mines in his own hands, a rupee was charged for a camel load; but prior to farming them out to the Jummoo Rajas, he had raised the price to two rupees. Now the price of a camel load varies from six to eight rupees, and, before reaching Ambala, paying hire, duty, &c., it costs from eight to twenty rupees.

A paper, by Captain E. P. Delhoste, on the Phoonda Ghaut country betwixt Viziadroog and the Ghauts.—Captain Del Hoste is at present employed in superintending the construction of a road through the Phoonda Ghaut. The primary object of the enquiries directed by Government to be made by Captain Del Hoste was to examine the coast from Bombay to Goa, and to fix upon a point, and a line of road leading from it to the interior, such as might improve the communication of the Southern Mahratta Country with places to seaward. Vingorla is an open roadstead: the road from it to the interior is through the Ram Ghaut by a line pronounced incapable of improvement. Kolapore was almost isolated—the only means of reaching it being by Poona and Sattara, a roundabout of two hundred miles; the other by the port of Rutnagherry and the Ram Ghaut, a circuit of eighteen miles, with a port and a coast as bad as Vingorla, and a road worse than that by the Ram Ghaut. The new line recommended was by Viziadroog, with a road thirty-three miles in length to the Phoonda Ghaut, thirty-eight miles east of Malwan. The first part of the line is over laterite; after which a fine rich undulating country is traversed. Villages are plentiful, and their environs are beautifully wooded: the people seem contented and well-behaved. There are temples everywhere; but there are no roads deserving of the name. Carts are unknown, and loads of every kind are carried on men's heads or bullocks' backs. The rocky ridge is considerably lower opposite Viziadroog than anywhere along the mountain line, which runs nearly north and south: the summit level of the Phoonda Ghaut is sixteen hundred feet, that of the Ram Ghaut two thousand three hundred, of the Mahabuleshwar four thousand five hundred. Captain Del Hoste stated that he had found granite, quartz, clay slate, primitive limestone, and old red sandstone, and he hoped to fall in with coal. The descent from the Ghaut to the Southern Mahratta Country was gentle and easy;

The salt is sold in the bazaar at the rate of from thirteen to fifteen seers per rupee.

The mines are guarded by a party of the Raja's hill troops. In the central division of the town of Pind Dadur Khan, (it being divided into three,) which contains about 10,000 inhabitants, there is a mud fort, also garrisoned by a battalion of these troops, with some horse artillery; facing it, there is a wide plain, on which the salt was lying in great quantity; here also scales are erected for weighing it prior to loading the camels, of which there were about seventy or eighty present.

Koura Mine.—Further to the westward is the largest mine, viz. that of Koura, so named from a village of that name. It is four coss from Pind Dadur Khan, and the route to it is similar to that which leads to the other mines, up the bed of a mountain torrent, containing but little water:—its banks however were in many places covered with efflorescence of salt, resembling much, from its pure white color, snow that had newly fallen. The village of Koura, built on the acclivity of a small hill, is close to the mine, and contains about 250 inhabitants. Here we were met by some of Raja Goolab Singh's people. The shaft is similar to those already described, but of a greater length, being not less than 300 yards. In sinking it, much practical knowledge has been evinced; thus, in the gallery we frequently pass beds of ten and twelve feet in thickness; these however, have been cut through, and left untouched, and the shaft carried on to the great deposit; but how the individual who first opened the mine was led to conclude that a large bed of salt existed beyond the smaller ones, (it being so contrary to the native character to risk capital if a means of repaying him with interest for that he has already laid out is presented, which undoubtedly the beds mentioned would have done,) whether by the out-cropping of the salt in another part of the hills, from mining operations carried on in some other place, or from geological reasoning, we could not ascertain. Even as to the definite time when the mines were opened, we could not get any information, further than that it was during the time of the emperors. On entering the mine all the natives took off their shoes and proceeded barefooted. After we had gone down the gently inclined plane some two hundred yards, the air became very oppressive. To descend into the great cavities we found a similar arrangement of steps cut in the solid rock salt, but the sight presented here was truly magnificent, far surpassing any geological exhibition that we had ever witnessed, and well repaid us for our suffocating trip. By the innumerable lamps the mine was well lighted up, which, being reflected by the beautiful crystalline walls, formed a splendid and brilliant hall of about three hundred feet in circumference, by fifty in height, contrasting well with a deep dark abyss, to the end of which the eye could not penetrate, formed by an old abandoned shaft which water had inundated. Adjoining to this,

the regions around rich and beautiful, abounding in rivers of water, and with a fine healthy agreeable climate; the soil seems well suited for the growth of many varieties of European vegetables. The arrangements now in progress will speedily put it in the power of the inhabitants of Bombay to examine the country for themselves. Twenty hours' steam will carry them to Viziadroog ; thirty-three miles of a road lead to Phoonda Ghaut, from which Belgaum and Kolapore are quickly accessible. The specimens illustrative of the paper were portions of siliceous spar, agate, vessels very neatly made from pot-stone, conglomerates, limestone, iron ore, shale, quartz, &c. &c.

ÆROLITE FROM NEAR DHARWAR.—The following letter was received from Captain George Wingate, of the Bombay Engineers :—

" I beg to transmit two fragments of an ærolite, which fell about one o'clock P. M., of the 15th February last, in a field to the south of Negloor, a village situated within a few miles of the junction of the Wurda and Toomboodra rivers, and belonging to the Gootul division of the Ranee-Bednoor talook of the Dharwar collectorate.

" The fall of this ærolite is most satisfactorily established. A cultivator of Negloor, named Ninga, was driving his cattle out to graze close by where it fell, at the hour above mentioned, when he suddenly heard a loud whirring rushing noise in the air, but on looking up could see nothing. An instant afterwards, however, he observed a cloud of dust rise from a spot in an adjoining field, as if something had struck the ground there with violence. At this time several other villagers were standing by a threshing-floor close at hand, who also heard the noise, and one of them called out to Ninga asking whether he had also done so. He replied yes, and that something seemed to have fallen in the next field, where he

there are several others in a similar state. The thickness of the principal bed could not be ascertained, as it occupies the whole extent of the mine, but it is upwards of several hundred feet.

Characters of the Rock Salt —The rock salt in colour varies from white to flesh or brick red, granular, the concretions being very large and very compact, so much so, that various ornamental articles are cut out of it. I was presented with a series of small vessels of it, which were highly polished; in pieces of about an inch in thickness it is transparent or semi-transparent; it occasionally assumes the stalactitic form—several stalactites of a pure white colour, and more than a foot long, were brought to me. This salt is extensively used throughout India, and is so pure as only to require grinding.

At 8 A. M., the thermometer stood in the shade at 45°, in the mine at 82° ; but owing to the particular state of the air, it appeared to be much more ; to health it is most prejudicial ; the natives informed me that all of them suffer severely, after working a few years, from affections of the chest, so much so, that the average period of life with them does not average more than thirty five to forty years—all presented a most sickly appearance, similar to that which we observed in individuals living near to marshy districts in the Pinjore valley.

Relations of the Strata —The relative position which the strata bear to each other is well seen in the section formed by the bed of the nullah. Here we have a red compact sandstone forming the fundamental rocks, and inclining at an angle of 35° to 55°. Resting upon it we find the red marl in which the rock salt occurs imbedded, Gypsum does not occur in beds, but imbedded masses in the marl. In color the marl is red. green, greyish white, &c Forming the superincumbent rock there is a breccia, consisting of red sandstone, marl, gypsum, and limestone, held together by calcareous matter, and resting in an unconformable position, as the rock at Jelalpore, and, like it, the limestone boulders contain organic remains, and in such quantity do they occur as to lead to the supposition that it has been almost entirely, though not exclusively, formed through the agency of the fossil animals. Since the brilliant discoveries of Ehrenberg with the microscope, which have brought to light a new world of animals, the old dogma, omnis calx e vermibus ; omnis silex e vermibus ; omnis ferrum e vermibus, has been again revived ; the size of these animals is sometimes so very minute that Ehrenberg has proved that a million may occur in a cubic inch of chalk. But it has been proved that the organic matter does not always bear the same proportion in chalk from different quarters : —thus, in specimens from the North of Europe the quantity of inorganic earthy chalk exceeds that of the organic bodies ; but in specimens from the South of Europe, the animal remains largely predominate. Ehrenberg, in his work on the animalcular constitution of chalk, describes and figures specimens from

saw the dust rise, pointing at the same time to the spot. The whole party then immediately proceeded there, and found to their astonishment the ærolite broken into fragments, of which those now forwarded were alone of any considerable size. The stone, from the velocity of its descent, had made a hole of several inches in depth,—like the print of the foot of a young elephant, as the villagers described it. They were naturally much puzzled to account for the appearance of the stone, which altogether differed from any to be met with in their neighbourhood; but at length were constrained to conclude that it had fallen from the sky. The circumstance seemed so extraordinary that one of them was immediately sent to summon the Patel of the village to the spot, who soon arrived, attended by a crowd of people who had also heard the wonderful tidings. These too, unanimously adopted the same conclusion regarding the fall of the stone, and the Patel took into his charge the accompanying fragments, and wrote a report of the whole circumstances to the Mahalkurree of Gootul, who is revenue and police officer of the district in which Negloor is situated.

"The Mahalkurree thought the Patel's report so extraordinary that he determined at once to proceed to Negloor himself, to enquire as to its truth, which he did. And after having examined the stone itself, as well as the hole in the ground made by its fall, and found all the accounts of the villages who were present to agree, he could not avoid coming to the same conclusion that they did, regarding its fall from the sky. To place the matter beyond doubt, however, he took statements in writing of the circumstances from the cultivator Ninga and another, who had heard the rushing noise made by the stone in its passage through the air, and forwarded their depositions, with his own report and the fragments

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twelve localities in Europe, Asia, and Africa, all of which are filled with foraminiferous and other chambered shells; the number of species amounting to eighty-one, some calcareous and some siliceous, including twenty-two species of microscopic nautilites, nummulties, and cyprides, and forty species of infusori; with these there are a few confervæ and other minute vegetables.* That the calcareous matter which invests the exuviæ of molluscous and radiated animals found in the limestone above-mentioned, as also in a nummulitic limestone which we shall afterwards notice as occurring among the Himalayas, the limestone of Caraberg, the muschelkalk of the continent of Europe, the nummulitic limestone of Hussan Abdal, the encrinal and coral limestone of the silurian and carboniferous systems, is a segregation, (as supposed by Buckland and Jameson,) from the water in which these were deposited, and not formed by the animals themselves, is more than probable.

As we ascend the Pass leading into the salt range, which lies four coss to the N. W. from Pind Dadur Khan, we cross over a range of limestone abounding with organic remains, similar to those met on the boulders; in height it is about 500 feet, very rugged and steep, and two miles in length. At the summit is the village of Chout: we then get into a large and well cultivated valley, through which our route lay six miles, and cross a small hill of fossiliferous limestone, in which a thick bed of brown iron ore or hematite occurs imbedded, and, from Ehrenberg's researches, we are entitled to infer that in it organic remains will be found. Descending a gentle acclivity, we arrive at the small but pretty village of Choia Sydun Shah; from whence the road to Rotas winds along the bank of a small stream, whose water is supplied by a large spring in the centre of the town. Its inhabitants are mostly all fuckeers, and it is so celebrated for its sanctity by the Hindoos as to cause them to bring the bodies of their relations here, for fifty miles round, in order to burn them. When we were there, there were several burning, and the ashes of others collected in heaps. Of Maharajah Runjeet Singh, who has built a large house, it was a favorite resort, and there was one building for the Jummoo Rajas, (Dhian Singh and Goolaub Singh) The building material is limestone, the rock of the district. On it in the neighbourhood of Rotas there is a coating of calcareous sinter and tuffa, † fifteen feet or more in thick-

* Buckland; Edinb. New Phil. Journal, vol. XXI., p. 441.

† Probably this is the rock alluded to by my friend Mr Griffith, in his report on the subjects connected with Affghanistan. When mentioning the sources of springs, he says—"The bed of the ravine by which the army descended from Lala Ghurree Beg, was found to be dry to within one mile of Ali Musiid, at a place called Siri Chushma, where there are copious supplies *from a soil of cavernous limestone.* Indeed, this rock seems to be the principal source of the springs of the country in those parts beyond the influence of the melting of the perpetual snows." Journal Asiatic Society, new series, No. 34, page 809.

of the ærolite, to Mr Goldfinch, the assistant collector and magistrate in charge of the district, who has kindly placed them at my disposal.

" Had the evidence in proof of the fall of this stone been less conclusive than it is, we might still have inferred the fact of its being an ærolite from its peculiar appearance, so different from that of any rock in the neighbourhood of the spot where it was found. For miles around the village of Negloor, the only rocks to be found are primary clay slate of various degrees of induration, and occasional dykes, masses and boulders of greenstone, but not a trace of any volcanic product, or other stone bearing the remotest resemblance to the one under consideration. The latter, moreover, tallies exactly with the descriptions given of ærolites. It is coated with the fused crust or film characteristic of these bodies, and is evidently highly metallic. On the theory of ærolites being planetary bodies which become fused on their surfaces, and burst by the sudden evolution of heat occasioned by their rushing at immense velocities into our atmosphere, the specimen now forwarded may be supposed to have formed part of a globe, or rather mass approaching the spherical shape, of somewhat more than a foot in diameter, which burst into fragments under these circumstances ; and the difference in appearance of the position of the fused film over the rounded part of the specimen, which may be considered to be a portion of the surface of the original globe, and of that coating the remaining parts, which according to this view were the rough broken surfaces of the detached fragment, would seem to favor this explanation.

" These remarks, however, are merely thrown out in the way of conjecture, as I do not pretent to any knowledge that would entitle me to theorize on the subject at all. My object in writing at so much length has been to shew that the specimen now sent is part of a true ærolite, and as such, I hope it will be thought worthy of a place in the new Museum."

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ness, shewing that springs (they being spring deposits,) were formerly more abundant than they now are. They, as well as the limestone, are extensively used for building purposes, and for making lime.

Springs.—The Springs, like all the other springs in the Punjaub and Affghanistan, * which issue from limestone districts, belong to that division which is hot in winter and cold in summer, the temperature of the air in the morning being twenty degrees lower than that of the water. Similar springs are met with among the Himalayas, in the Bijouni valley, between Saeeki Huttee and Belaspore, Cohat, Hussun Abdul, &c. The depth of the one at Rotas is said to be unknown. Regarding it there is a tradition which I was told by a native, viz., that a man who had been engaged making a rope for twelve years attempted with it to fathom it, but could not find any bottom. Opposite the spring a *shamianah* is erected, and beneath it a *charpoi*, covered with a white sheet ; here a *Grunth*, (the sacred book of the Sikhs,) is placed, and before it sits a man night and day with a punka in his hand, to drive away flies, repeating passages from the sacred volume.

From Rotas on to Maree on the Indus, the whole country consists of extensive plains surrounded by mountains, in general barren in the extreme. It is in these that the best horses of the Punjaub are bred, but that does not infer much, as a very good country-bred horse is seldom seen.

The higher and mountainous parts of the country are composed of limestone and red marl, and the plains, when an outcrop is seen, of sandstone and conglomerate, the former being sometimes of a green color, and but little inclined. At Kullur Kahar, the conglomerate is unconformable to the other rocks, and its character differs from that rock at Jelalpore, in the limestone containing no organic remains. Proceeding onwards W. N. W., we cross many mountain streams or nullas, all of them in general receiving the name of Soane, owing to the sand on their banks containing gold, for which it is extensively washed during every month of the year, that of December, January, and February excepted. The gold obtained is similar to that found on the banks of the Indus. From Muzan to Maree the country is still open. till within three coss of the latter, when the mountains contract, forming a narrow defile, the saliferous rocks on either side rising to a height of two and three hundred feet. As we approach near the banks of the river, the country is covered with boulders of trap, granite, syenite, hornstone, porphyry, &c.

* See Reports by Lord, Burnes, Griffith, &c.

The mass of stone which accompanied this was somewhat ovoidal ; it weighed four pounds, measuring fifteen inches round the larger, and eleven round the shorter, axis. It was covered over with a black-looking vitrified crust, about one-twentieth of an inch in thickness. This refused to yield to the action of muriatic, nitric, or sulphuric acid. One end of it was marked with impressions such as a slightly softened body might receive on being thrown violently against the earth. The sp. gr. of the crust was a little over three, or somewhat heavier than marble : it had not been quite accurately determined, from the difficulty of separating the crust from the interior. The interior of the ærolite was exactly like softish white sandstone—it crushed between the fingers, and absorbed, when immersed an hour in water, one-hundredth of its weight. Its specific gravity was 3·5, or a third heavier than the heaviest sandstone ; that of quartz being 2·6. It slightly effervesced with muriatic acid, giving off much sulphuretted hydrogen gas, and then slowly dissolved into a glairy mass. It seemed full of metallic particles, which shone beautifully under a moderate magnifying power, with direct light. The following note by Dr Giraud gives particulars of the results of the first examination of its characters :—

" The stone is acted on by cold hydrochloric acid, with disengagement of sulphuretted hydrogen. Boiling, but not cold, nitric acid acts on it violently, disengaging HS and NO4. The great mass of the stone is silica : the metallic granules consist of iron in large proportions, with nickel and chrome—in fact, meteoric iron. The nickel of course is much obscured by the iron : the chromine was readily detected, for on fusing the stone with nitre, dissolving the fluid mass in distilled water, and then testing with acetate of lead, a fine yellow chromate of lead was obtained. On fusing the stone with nitre, chromate of potash was

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Maree and Kalabagh.—Of all geological sites in India, there are probably none more interesting or important than that comprehended under Maree and Kalabagh, the former on the East, the latter on the West, side of the river Indus, and distant from each other about half a coss ; interesting for the nature, position, and organic remains which the rocks contain ; and important from its mineralogical riches.

Rocks.—1. Magnesian Limestone.
2. New red Sandstone.
3. Fossiliferous Limestone.
4. Red Marl and Sandstone, with
i. Coal and Mineral Sulphur.
ii. Rock Salt.
iii. Gypsum.
iv. Brown and red Iron Ore.
v. Alum Shale.

The oldest rock met with is the magnesian limestone, which varies in color from pale grey to dark blue—fracture more or less conchoidal, with an earthy aspect : hornstone occurs in it in layers or imbedded masses. The lower beds are destitute of organic remains, but the upper abound in them ; the most common fossils being marine shells belonging to the genera producti, spirifer, gryphæa, nautilus, &c. Imbedded in it there are also enormous masses of red and brown iron ore or hematite, which, resisting the action of the weather better than the limestone, stand out in bold relief. In many places the needle of the compass is rendered quite useless, even at a considerable distance from the rocks, owing to their being highly magnetic from the quantity of iron which they contain. Resting upon the limestone, we have sandstone, varying in colour from greyish white to dark reddish brown ; in some places so soft as to crumble under the finger ; in others so hard as to give sparks with steel. The compact dark variety, whose colour is owing to the peroxide of iron, abounds with teeth, bones, and coprolites of enormous animals, judging from the size of first ; but whether they belong to saurians or sauroid fishes, we have not been able to determine, from the imperfect nature of the specimens, but probably to the latter. In Cutch, a caudal vertebra, said by Messrs Clift and Owen to belong to a saurian, has been found in strata which appear to belong to the lias or oolite period. * We broke up enormous slabs

* Grant's Trans. Geological Society, 11. Sec. Vol. V.

of course produced. I cannot detect any cobalt, which you know Stenmeyer found in the mixture of iron at the Cape of Good Hope."

Captain Wingate's letter and specimens had arrived most opportunely, when the subject of ærolites was occupying much of the attention of philosophers at home. The following abstract had been laid before the Royal Institution on the 7th of April, of all that was known regarding them :—

" The established data were stated to be, that meteoric stones, spongy masses, and diffused matter or dust in considerable quantities, have fallen from the atmosphere. And the unsettled questions appear to be—whether shooting-stars are asteroids, planetary bodies, revolving round the sun in elliptic orbits, and only rendered visible to us at the nodes, when the orbits of the earth and of these asteroids intersect, or whether they are satellites revolving rapidly round the earth in orbits more or less eccentric, and occasionally plunging into the upper regions of the atmosphere ; whether their origin is the condensation of nebulous matter, ' star-dust,' ' world-dust,' or whether their masses were derived from the bursting of a planet ; whether their luminosity is due to contact with our gaseous atmosphere, or with an electrical atmosphere which may extend far beyond the limits of the gaseous one ; whether they are self-luminous, exploding like a sky-rocket, breaking into minute fragments, too small to be any longer visible to the naked eye ; whether they shine by their own light, and suddenly cease to be visible ; or whether they shine by the reflected light of the sun, and cease to be visible by passing into the earth's shadow, by being eclipsed : whether meteors and aërolites are fragments detached from asteroids, and hurled to the earth by terrestrial attraction ; or whether they are condensations of diffused matter. This latter view, a cosmical origin, includiug also the true asteroids themselves, Professor Powell advocates,

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of red sandstone studded with teeth, some of whose summits were quite flat, being worn down, shewing that the animal to which they belonged had far advanced in years. In the coprolites, teeth and scales occur, pointing out that their habits were carnivorous. In England, in this formation, the remains of two saurian genera, palæosaurus and the codontosaurus, have been found,* and they are the most ancient examples of fossil reptiles yet found in the British islands. In their organization, they are allied to the iguana and monitor. In Germany, saurians have been met with in the zechstein limestone, which is the oldest rock on the continent in which these remains have been found ; they belong to the genera protorosaurus, also allied to the monitors. It is, however, remarkable that the sandstone in which the organic remains occur at Kalabagh is deeply coloured with the peroxide of iron, and it is a well known fact that scarcely any are ever found in rocks where this metal is found to abound : thus we often find red and white sandstones alternating with each other, but only the latter containing organic remains ; and in England and Scotland it is the grey and calcareous beds. Some exceptions to this rule are met with, as in Forfarshire ; and Lord Greenock, we think, found fossil teeth and coprolites in a red sandstone in East Lothian.

Resting upon the red sandstone we have the red marl, in which the rock salt and gypsum occur imbedded. Its colour, as in other quarters mentioned, varies exceedingly, being red, white, blue, green, &c. The rock salt occurs in vast beds of several hundred feet in thickness, exposed, and close to the edge of the river, so that when it rises, owing to the hot season causing the melting of the snow in the mountainous regions to the N. and N. N. W., it uniformly washes away a part of the salt. Its color is generally red, approaching to rose red, but sometimes white—structure lamellated, but very compact. The gypsum associated with it is either of a rose red, or greyish white colour, and of a granular structure. Like the rock salt, it occurs forming mountains of considerable height ; in some places we find it studded with crystals of rock crystal, the color varying in general with the rock ; the most beautiful varieties are the rose red, but they also occur white, grey, brick red, black, &c., varying from transparent on the edges to semi-transparent, transluscent, and opaque ; in form generally the six-sided prism terminated by the double six-sided pyramid, but with numerous modifications of the terminal planes, and sometimes the lateral planes are wanting altogether, when we have formed the double six-sided pyramid. In other crystals one of the lateral planes will be large at the expense of all the other five, which are only represented in minature, but the forms are much too varied to attempt to notice them all. In size they vary from that of millet seed to two or three inches. The

* See Proc. Geological Society, No, 45, Messrs Riley and Stuchbury, as quoted by Lyell.

and he says, as there is no evidence of large solid masses moving through the planetary spaces, and many arguments against it, it seems more probable to imagine *diffused* matter in a highly electric state to encounter the earth's electric action, and a discharge to ensue of greater or less violence, which, in its more intense degree, may suffice to attract together and condense, and even to fuse, the loose matter into larger or smaller masses or particles, which in that state fall to the earth; while, in the less intense conditions, there may be no more than an evanescent flash, marked by a train of light, or the fall of loose matter. In some cases, vast numbers of these lesser luminous exhibitions may take place together, from the passage of the same diffuse mass, which, under more energetic conditions, would give rise to only a few, or perhaps a single large luminous meteor, attended with the fall of a more or less condensed mass or smaller masses.

"The opinion first propounded by Chladni, and adopted by Humboldt, that shooting stars and meteors are planetary bodies revolving round the sun, requires, it is considered, their number to be prodigious to satisfy the facts of observation, and if such innumerable asteroids continually enter our atmosphere, and pass within a few miles of the earth, how is it they never come in contact with it? For be it remembered, Mr Strickland says, aërolites are not regarded as being the shooting-stars themselves, but only as fragments left behind them in their course. 'Can we suppose that our earth, a body of nearly 8,000 miles diameter, should be incessantly forcing its way through showers of these planetary bodies, hundreds of which daily approach in their circumsolar revolutions within from 16 to 140 miles of the earth, and yet that they should never impinge upon its surface? Should we not in that case continually hear of these fiery masses, with diameters from 80 to 2,600 feet, and velocities of thirty-six miles a second, dashing into

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resplendent appearance presented by the gypsum when the sun is shining, produced by these imbedded crystals, is very striking. The occurrence of rock crystal in this locality is both very extraordinary and exceedingly interesting, and this is the only one that we are aware of in which silica in a pure state is thus associated with sulphate of lime. In the carbonate of lime or limestone it is met with, but even in this locality it is rare. The crystals are of contemporaneous formation with the gypsum, and probably have been formed by segregation of silica from that rock. In the rock salt, though much more rarely, crystals are also found imbedded.

Associated with the red marl there is a *white sandstone*, in which coal, along with *mineral* sulphur, occurs. To examine its value and adaptation to economical purposes, particularly steam vessels, was one of the principal objects of my journey to this place. The late lamented travellers, Burnes and Wood, had each reported, I believe, to Government, and pointed out that this district would yield coal in sufficient quantity to supply the demand; if, however, any attention had been paid to the geological structure of the country by them, they could have at once declared that no coal of value or worth working would be found.

Some months prior to undertaking the journey, a series of papers regarding the coal of Kalabagh was put into my hands by Mr. G. Clerk, Governor-General's Agent, requesting me to give my opinion as to the probability of coal being found in the district of Kalabagh, in any quantity. After perusing the papers, I answered in the negative, unless it was found that the true coal formation, or carboniferous system, dipped under the saliferous system, out-croppings of which might be found containing beds of coal. Such, however, is not the case. But one of the enterprising officers mentioned has even gone further, and asserted, that "were the salt range East of the Indus examined by a geologist, there is ample reason to believe that discoveries of value to Government would be the result," alluding to the discovery of the coal. In a private letter to the address of Mr G. Clerk, an extract of which has been published in the Asiatic Society's Journal, we mention the existence of coal, probably the same as found by Burnes* and Wood; it is not true bituminous coal, and, had they examined the localities in which it was found, and the district, they would, had they been at all conversant with geology, have come to the conclusion that the Kalabagh district would not yield coal in sufficient quantity fit to be used

* Specimens of supposed coal were transmitted to the late Secretary of the Asiatic Society in 1832, from Luchee, Kurpa, &c. On examination, he found that they were nothing but bituminous shale. How such an error could have been committed in forwarding such specimens, is very extraordinary.

the body of our earth like cannon balls into an earthen rampart ?' Impressed with this conviction, Mr Strickland originated the idea of the satellitary nature of shooting-stars and aërolites, and, to account for the nearly periodical recurrence of an increased number of meteors at certain annual epochs, he conceives the electrical atmosphere of the earth to be from some annually recurring cause, temporarily extended, intersecting the orbits of the satellites.

" The question of the origin of shooting-stars seems to have excited more controversy than any other; but for the solution of this difficulty Sir John Lubbock apprehends we possess no data which do not apply equally to the moon and the other bodies of the solar system. He treats them both as planetary and as satellitary bodies, and refers to the interesting calculations of M. Petit, not only as rendering probable the existence of small satellites, but tending to establish the identity of a body revolving about the earth in about three hours twenty minutes. Sir J. Lubbock attributes their luminosity to reflected light, and their obscuration to eclipse. And it seems to him that the splitting of the falling stars, like a rocket, and the trains of light, a phenomenon often witnessed, might, if other circumstances were favorable to the explanation, be accounted for by supposing the star to graze the surface of the shadow before absolute immersion."

The following gentlemen were unanimously elected members of the Society :—

1st.—Henry Conybeare, Esq.—proposed by the Revd. Geo. Pigott, and seconded by Captain H. J. Barr.

2nd.—Captain P. T. French—proposed by Dr Buist, and seconded by Dr Glen.

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for economical purposes. In no place has *bituminous* coal ever been met with worth working above the magnesian limestone. Statements have been made to this effect, but, when properly examined, have invariably been found to be incorrect. In the letter above quoted, dated 15th Nov., 1841, we state, that the coal met with at Kalabagh occurs in thin seams in a white sandstone that alternates with the red marls, in which the rock salt and gypsum are imbedded. The largest seam is in breadth about seventeen inches, consisting partly of coal, sandstone, and mineral sulphur. The coal met with is partly brown coal and lignite, and partly jet, and not true bituminous coal; but well adapted, from the experiments which we made on a small scale, for steam purposes, burning with much flame, emitting much gas, and at the same time leaving but a small quantity of earthy matter or ashes. * Probably, however, they were led into error, which even in Britain sometimes happens, by confounding the alum shale, which is of a greyish black colour, and is associated with the white sandstone in which the seams of coal occur. This is not at all improbable, as the colour of the alum shale is so very dark, and so apt to deceive the eye of the traveller; the colour too, is owing to bituminous matter. The use of coal as a fuel is unknown to the natives, being used by them as a medicine in various diseases, and is so much prized as to have led them to suppose that a large sum would be given for it. From the different seams, about two thousand maunds had been collected, and brought to the town of Kalabagh, where it was stored up by a number of individuals, in quantities of from 10 to 100 maunds, for which they expected to get four rupees per pucka maund—ib. 64.

Alum Shale —Next to the rock salt in economical value at Kalabagh is the alum shale, from which large quantities of alum (sulphate of alumina) is manufactured. In making it, there are fourteen manufactories engaged, with from twelve to eighteen workmen in each. The alum shale, which occurs in great beds, alternating with the red marl, and containing beautiful twin crystals of selenite, is brought to the manufactories on donkies, at the rate of an anna per pucka maund.

Manufacture of Alum.—To procure alum, the following is the process adopted :—first a layer of wood of about two feet in thickness is placed on the ground, above it a layer of alum shale of about the same thickness, which is sprinkled with water; the layers are continued successively for six or seven times, till the heap reaches to a height of from twenty-five to thirty feet; the wood is then lighted, and in the space of from twelve to twenty-four hours the fire is extinguished. By this time the greyish black colour of the shale is converted into blood red. When cooled, a thousand maunds of it are thrown into a brick tank, and mixed with as much

* Journal of the Asiatic Society, 2nd Series, No. 37, p. 2.

3rd.—J. G. Lumsden, Esq.—proposed by the Hon'ble Mr Willoughby, and seconded by Dr Glen.

4th & 5th.—Lieuts. A. Grieve, and A. D. Taylor, I. N.—proposed by the Revd. Mr Pigott, and seconded by Captain Barr.

The following donations to the Society were laid on the table :—

PAPER.—*By the Author*, through Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden. Meteorological returns and diagram shewing the high and low water at Seerah, and state of the atmosphere at Shum Shum, at Aden, for the month of April, 1848, by Sergeant W. Moyes. With a letter dated Seerah, the 17th May, 1848.

BOOKS.—By Government. The Journals of the Indian Archipelago and Eastern Asia, from July 1847 to March 1848. With letters from J. G. Lumsden, Esq., Secretary to Government, General Department, dated the 17th May, No. 1738 of 1848, and No. 2002 of 3rd June 1848.

By Government.—Report on a Passage made on the Nurbudda River, from the Falls of Dharee to Mundlaisir, by Lieut. Keatinge; and of a similar passage from Mundlaisir to Broach, by Lieut. Evans. With a letter from J. G. Lumsden, Esq, Secretary to Government, General Department, dated the 22nd May, No. 1825 of 1848.

RETURN.—By the Author.—Return shewing the number admitted into Hospital, diseases, and deaths, among all the European Troops serving under the Bombay presidency, from the year 1841 to 1847, inclusive; and a chart exhibiting the per centage of deaths for the same period. By Lieut. Col. N. Campbell, Quarter-Master-General, with a letter dated Hills, the 11th May 1848.

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water, where it is kept for three days, or until the water has acquired a deep red colour : the water is then let off into another tank, all the clay being left behind, and from it strained into a large iron boiler, and boiled for three or four hours until the quantity is reduced to a fifth. From this boiler, after being cooled, when it is said to be cutcha, and mixed with two maunds of potash, it is conducted to another boiler, and then boiled till it is ready, which is ascertained by removing a small quantity, and if it then hardens into a solid mass it is considered so. When still hot, it is placed in red clay vessels capable of holding three pucka maunds, and after crystallizing, the vessels are broken off, leaving an immense round mass of solid alum; it is not, however, quite pure, being of a red colour and semi-transparent—the colour is owing to the iron which it contains. This is the case with most of the alum which we have seen in the Upper Provinces. It is sold at 19 Rupees and 4 annas the camel load of six maunds, (equal to 384 lbs.) of which, however, two rupees and four annas are exacted as duty by the Mallick. After removing the clay from the vat, it still retains the bright red colour which attracted so much the attention of Elphinstone when there in 1809, who, with the eye of a traveller, thus notices it : " All the earth, particularly near the town (Kalabagh,) is almost blood-red, and this, with the strange and beautiful spectacle of the salt rocks, and the Indus flowing in a deep and clear stream through lofty mountains past this extraordinary town, presented such a scene of wonders as is seldom to be witnessed." * How long alum has been manufactured is uncertain, but from Elphinstone's observations it appears to have been so, though he was ignorant of the circumstance, long before he visited the place.

Nitre.—It is not met with in the immediate neighbourhood of Kalabagh ; but the soil, from whence it is obtained, which is of a deep black colour, is procured about eight coss to the southward.

The Mallick of Kalabag, (Ullah Yar Khan,) derives his income, amounting to Rupees 10,000 per annum, almost entirely from the mineral resources of the country. The salt trade, however, is monopolized by Raja Goolaub Singh, who only allows him to sell two boat loads, varying from 300 to 700 maunds, per memsem. To the North-west but little salt is exported, as other mines in that direction occur.

* Kingdom of Cabul, vol. i. M. Todd, page 59.

LETTERS.—From J. G. Lumsden, Esq., Secretary to Government, General Department, No. 1896 of 1848, dated the 27th May, calling the Society's attention to the subject of Mr Chief Secretary Pringle's letter, dated the 23rd November, No. 3699 of 1846, and stating that no reports have yet been received, giving any information of the nature required by the Hon'ble the Court of Directors.

From Captain E. P. Del'Hoste, Assistant-Quarter-Master-General, dated Phoonda-Ghat, the 14th May 1848, forwarding a draft on account of his subscription to the Society for the official year 1848-49. Also some specimens of pottery, cups, plates, and dishes, made at Asiamutt, and informing that these can be had at a very cheap rate.

From Lieut. W. Christopher, I. N., dated Bombay, the 12th May 1848, submitting a few specimens to the notice of the Society, and presenting them to their newly-established Museum.

From Dr C. G. E. Ford, Assistant-Surgeon at Hoshungabad, dated the 16th May 1848, acknowledging the receipt of the Society's letter of the 6th, and tendering his best thanks to the Secretary and Captain Lynch for electing him as a member of the Society.

The thanks of the Society were directed to be transmitted to the several donors for their contributions ; and the meeting was adjourned to the second Thursday of July next.

THE Ordinary Monthly Meeting of this Society took place in their rooms, Town Hall, on Thursday the 10th August, 1848, at 3 o'clock P. M. Present :—the Hon'ble J. P. Willoughby, Esq., Vice-President, in the chair ; the Revd. Geo. Pigott; Captain H. B. Lynch, Deputy Superintendent of the Indian Navy; Dr J. Glen, Medical Board; Captain R. Ethersey, I. N. ; Captain H. J. Barr; Manockjee Cursetjee, Esq.; and Dr George Buist, L.L.D., Secretary.

The Chairman stated that, before reading the Minutes of last Meeting, or proceeding with the business of the day, he begged to move the following resolution :—

RESOLVED.—That the Society record its sense of the loss it has sustained by the demise of Sir Robert Oliver, who for many years past had been one of the Vice-Presidents of the Society, and who, as head of the Indian Navy, presided over a department of the Service to which the Society owes its existence, and from the members of which many of the most valuable papers which adorn its Transactions have been received.

This resolution was received in solemn silence, and assented to unanimously, and was directed to be put on record.

The Secretary stated, that from the absence of a large number of the members of the Society from the presidency in the second week of July, there had not been enough present to make a quorum. Captain Lynch presided, and Captain Barr acted as secretary, when a minute of sederunt and adjournment was made. The minutes of the previous monthly meeting of June were read and approved of in reference to the proceedings of the Sub-Committee on Meteorological and Tidal Observations. The Secretary stated that the papers to be laid before the Society as the report of the Committee, had been completed, but were still subject to the revision of the Committee, and in place of being laid before the meeting would be circulated with the view of their being acted on, before the dispatch of next mail for Europe.

The following gentlemen were unanimously elected Members of the Society.

Norman Oliver, Esq.—proposed by Commander G. Jenkins, I. N., and seconded by the Revd. Mr. Pigott.

Captain S. V. W. Hart—proposed by Captain H. J. Barr, and seconded by Dr Buist, L. L. D., Secretary.

The following Books, Letters, and Papers, were then laid before the meeting, and thanks directed to be given to the respective donors. The principal portion of the time of the Society was occupied in the discussion of some private arrangements in the details of the establishment, not requiring to be reported.

Papers.—By Government. Memoir on the Western or Edoor Tribes, inhabiting the Somali Coast of N. E. Africa, with the Southern Branches of the family of Darrood, resident on the banks of the Webbi Shebeyli, commonly called the River Webbi. By Lieut. C. J. Cruttenden, I. N., Assistant Political Agent at Aden, dated 10th April 1848. With a letter from A. Malet, Esq., Chief Secretary to Government, Political Department, dated 26th July, No. 3081 of 1848.

By the Author.—A Narrative of a Voyage in search of the Crew of the Ship *Charles Eaton*, performed in the year 1836. By Commander G. B. Kempthorne, I. N.; with a letter, dated 18th June 1848.

By the Author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations, as taken on Shum Shum and Seerah Island, at Aden, &c., for the months of May and June 1848. By Sergeant W. Moyes.

Books.—By Government.—The Journals of the Indian Archipelago and Eastern Asia on the Malayan and Polynesian Languages and Races.—By John Crawford, Esq., F. R. S. Vol. 2, No. 4, & Vol. 2, No. 5, with Supplement to No. 6 of Vol. 1, for April and May last. With letters from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 19th June, and 13th July, last, Nos. 2210 & 2535 of 1848.

Letters.—From the Hon'ble Captain Byron Cary, R. N., Private Secretary to the Right Hon'ble the Governor of Bombay, dated Dapooree, the 18th June last, acknowledging the receipt of the Society's letter of the 12th June last, and intimating, by desire of the Right Hon'ble the Governor, that his

Lordship feels highly gratified by the request therein contained, to become Patron of the Society ; and that it will always give him pleasure to further the interests of the Society.

From Lieut. A. Grieve, I. N., dated the 30th June last, acknowledging the receipt of the Society's letter, dated the 10th June last, and transmitting an order for the amount of his subscription for the current year.

From Assistant-Surgeon A. T. Anderson, I. N., dated 10th ultimo, requesting his name might be erased from the list of subscribers of the Bombay Geographical Society.

From J. Thornhill, Esq., Secretary to the British Museum, dated 15th June last, requesting to convey to the members of the Society the thanks of the Trustees for their present of a vol. of the Society's Transactions from February to December 1846, which the Trustees have duly received.

A Catalogue of the Books in the Library was directed to be drawn up, and printed, without delay,—to be issued in a separate form, along with the revised regulations. The following resolution was moved by Mr Pigott, seconded by Capt. R. Ethersey, and agreed to unanimously.

Proposed by the Revd. G. Pigott, seconded by Captain Jenkins,—that the publications of the Halkuyet Society be ordered for the Library of the Society.

THE ordinary monthly meeting of the Bombay Geographical Society took place in their rooms in the Town Hall on the evening of Thursday the 14th September —the Hon'ble J. P. Willoughby, Esq., Vice-President, in the Chair. Present: Captain H. J. Barr ; Dr J. Glen ; Captain H. B. Lynch, I. N. ; Revd. G. Pigott ; Commander C. W. Montriou, I. N. ; Major J. Holland ; Commander A. Grieve, I. N. ; Captain S. V. W. Hart ; Monockjee Cursetjee, Esquire ; and the Secretary.

Before the minutes of last meeting were read, a letter was laid on the table from Captain D. Ross, I. N., Master-Attendant, tendering his resignation as President, and requesting the withdrawal of his name from the Society—the state of his health not permitting him adequately to attend to the duties of the office. The Secretary was directed to write to Captain Ross in reply, expressing the deep regret felt by the Society that he should suffer from indisposition, but expressing a hope that he would not press the acceptance of his resignation, but that he would during his residence in India at all events continue to hold the office he had for ten years filled with so much zeal and ability, and allow the Society to look up to him as their president, with the hope that they might yet again see him in their chair.

The minutes of last meeting having been read and approved of, the Report of the Sub-Committee on Tidal Observations was laid on the table, and after some discussion, was received. Drafts of various letters connected therewith were read, amended, and directed to be transmitted to their destinations.

Munmohundass Davidass, Esq., having been proposed as a member of the Society by Dr Buist, and seconded by Captain Hart, was declared duly elected.

The following donations were laid on the table, for which the best thanks of the Society were directed to be given to the donors :—

PAPERS.—By Government.—Journal, by Lieutenant W Christopher of the Indian Navy, of his ascent of the River Cheenab, dated Vuzeerabad 1st October, 1847. With a letter from A. Malet, Esq., Chief Secretary to Government, Marine Department, dated 31st August, No. 1340 of 1848.

By the author, through Captain S B. Haines, I. N., Political Agent at Aden. Meteorological Observations as taken on Steam Sloop and Steam Island, at Aden, &c., for the month of July 1848. By Sergeant W. Moyes.

BOOKS.—By Government.—Table for determining Time to the nearest Minute, applicable to the Madras Presidency, and the Southern ports of Bombay : &c. &c. By William Grant, Esquire, Assistant Revenue Surveyor, D. P W With a letter from J. G. Lumsden, Esq., Secretary to Government General Department, dated 11th August, No. 2384 of 1848.

By Government.—The Journal of the Indian Archipelago and Eastern Asia for June 1848. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 8th September, No. 3220 of 1848.

From Smith, Elder & Co., of London.—Johnston's Physical Atlas of Natural Phenomena, purchased by the Society for £13 4s 0d—with a letter dated London, 19th July, 1848.

LETTERS.—From Captain E P. Del Hoste, dated Poona Ghat, 1st Sept. No. 170 of 1848, containing observations on the "Slag," or as called by the Natives "Tamba ke Kit," found in great abundance at the village of Lona in the Concan, about twelve miles distant from Poona Ghat. Also remarks on Sandstone, Gigantic Corals, Crystals, Quartz, Conglomerate, and Slate adapted for house-roofing, to be found in great quantities in that vicinity. The above letter is accompanied by drawings of the Gigantic Corals and of the Flower Kharwa.

From Captain Daniel Ross, of the Indian Navy, dated 7th instant, requesting that his name might be erased from the list of subscribers from the 1st of this month, in consequence of the bad state of his health, which obliges him to resign his seat as President of the Society.

MEETINGS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

THE Ordinary Monthly Meeting of this Society took place at their Rooms in the Town Hall, on Thursday the 12th October, 1848—Present: Dr. J. Glen, Member, in the Chair; Commander G. Jenkins, I. N.; Captain H. B. Lynch, I. N.; Captain H. J. Barr; Captain S. V. W. Hart; Captain P. T. French; Munmohundass Davidass, Esq.; and Geo. Buist, Esq., LL.D., Secretary.

The Minutes of last meeting were read and confirmed.

Captain H. Gribble having been proposed as a member of the Society by Commander G. Jenkins, I. N., and seconded by Dr. Geo. Buist, Secretary, was declared duly elected.

The following donations were laid on the table, for which the best thanks of the Society were directed to be given to the donors:—

PAPERS.—By the Author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations as taken on Shum Shum, from 1st to 19th of August, and on Seerah Island, at Aden, &c., for the month of August 1848. By Sergeant W. Mayes.

BOOKS.—By Government.—The Journal of the Indian Archipelago and Eastern Asia, for July 1848, Vol. 2nd, No. 7. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 28th September, No. 3442 of 1848.

MAP.—From Messrs. Bennett and Co.—Map of India, compiled from all the latest and most authentic materials—purchased by the Society for Rs. 20.

LETTERS.—From R. Clarke, Esq., Honorary Secretary to the Royal Asiatic Society of London, dated the 17th June 1848, acknowledging the receipt of the Transactions of the Bombay Geographical Society from February to December 1848, which were laid by him before a general meeting of that Society, whose best thanks for the same were directed to be conveyed; also requesting that the Royal Asiatic Society might be furnished with any previous or subsequent numbers of the Transactions that may have been published, and also any notices of the state and progress of the Bombay Geographical Society which would be interesting. Mr Clarke at the same time kindly offers to the Society a set of the Journals of the Royal Asiatic Society.

The Secretary stated that the whole of the despatches ordered by the Society at last meeting had been sent off. In the original draft of letter to the Admiralty, there were some passages which were directed to be omitted : it having been at the same time stated that as Dr Buist was in the habit of corresponding with Colonel Sabine on these subjects, there was no reason why he should not explain his wishes unofficially and by private letters. This he had done, and as the letters, though unauthorized by the Society, referred almost entirely to their affairs, he had entered them in the letter-book for reference, writing across them in red ink a note to the effect just stated. The Society intimated their entire approbation of the proceeding. A letter was read from Mr. Mayes, containing some researches on the relative force of the wind on Shum Shum and Seerah Island, as indicated by the wind-gauges, from which it appeared that the gauge indicated a much less degree of force at the upper point, 1,500 above the level of the sea, than at Seerah, 100 feet above the level. Capt. Lynch stated that this apparent anomaly would in all likelihood be found due to local position,—the lower gauge being exposed to some particular current, from which the upper one was exempt. In reference to enquiries by Captain Lynch on the subject of the quality and position of the instruments under Mr Mayes's charge, it was announced that his barometer was by Adie ; that one of his Tide-Gauges was the same with those formerly examined by the Society ; that his barometer was by the same maker. Beyond this the Society know nothing of the instruments under his charge. He had however been requested to furnish an exact statement of the number and kind of instruments he possessed—with a description of the nature of their arrangement and position—the amount and quality of the material in his possession, with copies of the instruments he had at first and from time to time received : so that the Society might be able to judge of the nature and value of their observations. The Wind-Gauges in his possession were believed to be self-registering, and similar to that by Ostler, in the Colaba Observatory—so at least it was inferred from the schedules returned by him. The request contained in his letter for a further supply of schedules had been complied with immediately.

A further set of numbers of the Transactions of the Society was laid on the table for distribution.

Captain Jenkins stated in the name of Mr Anderson, one of the Directors of the Peninsular and Oriental Steam Navigation Company, and who was then present, that the Company were at all times most anxious to forward Hydrographical and Geographical researches, and to assist those engaged in them ; and that they would be most happy to frank any parcel for the service of the Society to any port where their vessels visited.

The acknowledgments of the Society for so valuable an offer were directed to be returned ; and the directors were desired to be included amongst the numbers of those who received free copies of their Transactions. Mr Anderson kindly offered to take charge personally of anything desired to be transmitted by next mail, and was entrusted with a large packet accordingly.

The Secretary stated that he had before experienced the liberality of the Company on those points : that he had had lately nearly a ton of specimens taken from

Alexandria free of charge in 1845, and that Captain Gribble had repeatedly franked the Society's parcels to Madras and Calcutta.

It was stated that no answer had been received from Government on the subject of establishing immediately Observatories at Kurrachee and Viziadroog.—The meeting was adjourned to the 2nd Thursday of November next.

THE Ordinary Monthly Meeting of this Society took place at their Rooms in the Town Hall, on Thursday the 9th November 1848, at three o'clock P. M.—The Hon'ble J. P. Willoughby, Esq., Vice President, in the Chair. Present—Commander G. Jenkins, I. N.; Major J. Holland; Dr J. Burnes, K.H., M.D.; Dr J. Glen; and Dr G. Buist, Secretary.

The minutes of last meeting having been read and approved of, the following members were proposed, seconded, and elected unanimously:—

Proposed by Dr J. Burnes, K.H., M.D., seconded by Dr J. Glen, and elected unanimously—Dr John Patch, Member of the Medical Board.

Proposed by the Hon'ble J. P. Willoughby, Esq., seconded by Captain G. Jenkins, I. N., and carried unanimously—Dr M. T. Kayes, Assay Master, Mint.

The following papers, books, &c., were laid before the Society:—

PAPERS—By the Government.—Narrative of a Journey through parts of Persia and Kurdistan, undertaken by Commander J. F. Jones, I.N., of the Hon'ble Company's steam vessel *Nitocris*, in company with Major Rawlinson, Political Agent in Turkish Arabia—dated Bagdad, 31st December, 1847. With a letter from A. Malet, Esq, Chief Secretary to Government, Political Department, dated 21st October, No. 4409 of 1848.—By the Author, through Captain S. B. Haines, I.N., Political Agent at Aden,—Meteorological Observations as taken on Shum Shum, from 5th to 30th September, and on Seerah Island at Aden, &c., for the month of September 1848. By Sergeant W. Mayes.

BOOKS.—By Government.—The Journal of the Indian Archipelago and Eastern Asia, for August 1848, Vol. 2nd, No. 8. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 12th October, No. 3640 of 1848.

The Secretary stated that as the time for preparing the Meteorological and Tidal Observations now approached, it would be expedient to make some arrangement for preparing them and passing them through the press. The usual mode in which such things were managed was by a Committee on papers by the Secretary, in connection with a Committee, or by the Society directly under the Secretary.

It was then resolved that the Committee which had been appointed to report on the making of the scheme, should be re-appointed; but that the Secretary should first prepare the papers, and then submit them to the Committee for revision, and when revised to be placed before the Society, previous to publication.

The Committee, consisting of the Deputy Superintendent of the Indian Navy, the Deputy Quartermaster-General, the Officer in charge of the Observatory, and the Secretary to the Society, were accordingly approved as a Committee on publication.

The Secretary stated that at the same time he had at once given orders for the supply of schedules to Mr. Mayes—the charge for these strictly speaking devolved on the account for publication of observations, to which account if considered expedient it might be carried.

The paper by Commander Jones was ordered to be printed without delay. The meeting was adjourned to the 3rd Thursday of December next.

THE Ordinary Monthly Meeting of the Society took place in their rooms, Town Hall, on Thursday afternoon the 21st December, 1848—the Hon'ble J. P. Willoughby, Esq., Vice President, in the chair. The following members were present:—Dr. J. Glen, Physician-General; Captain H. B. Lynch, I. N.; Dr. M. T. Kayes; Captain S. V. W. Hart; Commanders G. Jenkins, G. B. Kempthorne, and C. W. Montriou, I. N.; C. J. Erskine, Esq.; and Dr. G. Buist, Secretary.

The minutes of last meeting having been read and approved of, the following propositions were laid before the meeting :—

1ST.—Proposed, that a note be added to the existing regulations, to the effect that notice be given, either at a previous meeting or to the Secretary, of any Motion or Subject of Discussion intended to be brought before the Meeting, at least one week beforehand ; and that all matters of business, &c., wished to be brought before the Society, be notified to the Members by Printed Circular.

2D.—That such arrangements be made as either to enable the Society to hang up its Charts and Roller Maps within their Rooms or in the Lobby, with a view of facilitating references to them.

3D.—That the Society accept the offer of Government to furnish them with Instruments for the Tidal and Meteorological Observations at Kurrachee and Vizadroog: and that they recommend the two Tide-Gauges lately offered the Society to be purchased for two other of the Observatories in contemplation, under the reservation mentioned by Government.

4TH.—That Government be requested to recall Mr. Mayes from Aden, and to employ him during the year 1849 in the establishment of other Observatories, it being unlikely that the Admiralty Instruments will be received before June, or that the Observatories at which it is proposed to employ them will be in operation before January 1850. Mr. Mayes can at this date return to Aden, so as to allow simultaneous Observations to be conducted at all the Stations.

5TH.—That the Society cause to be printed a short Manual of Instructions for Observers—such as may assist young geographers in their earlier researches.

These propositions were agreed to unanimously, with the exception of the fourth. The Secretary stated that the object of proposing this was, that as one part of

their scheme required simultaneousness of observations,—as the Society could not have more than two out of the ten observatories proposed to be established in operation in 1849,—as they had already one year of Aden observations preparing for publication, and as it would be requisite to have observations at Aden for 1850 at all events,—three years' continuous observations did not seem requisite,—so that Mr. Mayes might in 1849 be engaged in the arrangement of other observatories. The Chairman stated that he did not suppose any difficulty which could not be surmounted on the spot would be found in the establishment of local observatories, and the withdrawal of Mr. Mayes seemed, by breaking up for a time the whole of his establishment, and interrupting his exertions, likely to occasion more trouble than advantage. The meeting seemed to concur with the Chairman, and the Secretary stated that he had merely brought forward the subject for consideration, and would now, therefore, beg leave to withdraw the proposition altogether. Leave granted.

In reference to the Manual proposed to be published by the Society, it was stated that the cost of printing would be about Rs. 200. The Manual would be chiefly a compilation from such works as Simms' treatise on Instruments,—De la Beche's hints to Geologists how to observe,—Jackson's what to observe,—&c. &c.; with the Pressure tables of Calcutta, Madras, and Bombay, to which reference might be made in measuring altitudes. At present the barometer was assumed to stand constantly at 30 inches on the seashore, and on this assumption observations were computed. This was not only wide of fact for the mean of the whole year, but each particular month had its own range and mean pressure, and each hour of the day had its peculiar pressure. An observation made in the afternoon at the minimum of depression, under the impression that the Barometer stood as it did in the forenoon, would be at least 150 feet out. So uniform were these variations, however, that on placing the Curves for 1843 and 1844 on the same diagram, they very nearly coincided; and had the storms and other irregularities been struck out, they would most likely have done so altogether. So close were the coincidences at all times, that it seemed unlikely the publication of the observations in extenso would be required, and that they would confine their attention to the irregularities and anomalies. The tables of pressure for one year might thus, therefore, unless in cases of actual tempest, be referred to any other year with a very close approximation to correctness. These matters being acquiesced in, and the gross expense of publication for 300 copies having been stated at Rs. 200, of which probably a very considerable number would be sold, the publication was agreed to.

Captain Del Hoste stated in his letter that his establishment was too limited, and his own hands too full of work, to allow him to undertake observations at Viziadroog or Phoonda Ghaut.—A letter from Corporal Leach, of H. M.'s 22d foot, with a letter from the Astronomer Royal—Mr. Airie,—were laid before the Society. Mr. Leach had acquired considerable experience in making observations at Aden, and seemed a steady, intelligent, respectable man: he offered his services to the Society as an observer, provided leave could be obtained for him. The Secretary was directed to ascertain the terms on which Mr. Leach was willing to serve, with all other particulars: if these were found satisfactory, Government were to be addressed

on the subject. The Secretary was also instructed to enquire after observers for the other stations at which observatories might be established, and to report progress to the Society.

The Secretary stated that he was now busily engaged, in accordance with the instructions of the Society, in preparing the first series of their papers for press—the Aden observations for 1848,—the concluding portion of which had not as yet been received, though an enormous mass of papers from Mr. Mayes, referring to previous years, of which much use might be made, were now in their hands;—that, in conformity with the principle laid down in 1844, when the subject was first mooted, and which had ever since been acted on, the great object of the scheme was less to determine the Tidal and Meteorological phenomena at one particular part than to trace the connection of the appearance of these at places distant from each other. One of the great facts started with was to see and discover "how far the instruments were affected beyond the limits of perceptible perturbation, and at what rate and in what direction these perturbations apparently travelled,"—the Colaba Observatory being fixed on as the only settled and well-arranged establishment as the point of reference. It now became requisite to obtain access to the records of the Observatory before Mr. Mayes' papers could be turned to the account professedly intended—that of exhibiting the connection of ærial and oceanic phenomena at the mouth of the Red Sea with those on the shores of India. Captain Montriou having stated that it was impossible to permit the records of the Observatory to be withdrawn from it, a letter—of which a draft was laid before the Society and approved of—was directed to be written, asking permission to copy the monthly observations of the Observatory, such as were about to be prepared for the printer's hands. The object in asking permission to inspect the records, in place of making copies, was merely to save expence, time, and trouble: as it seemed to be thought that this was out of the question, the plan most acceptable to Captain Montriou was ordered to be resorted to.

A large collection of specimens from Phoonda Ghaut, presented by Captain Del Hoste, was laid before the meeting.

The consideration of a letter from Major Le Grand Jacob, on the subject of publishing Maps from those in the hands of Government, was deferred to next meeting, to permit time for the enquiries requisite to be made on the subject.

The Secretary stated that he hoped to have been able to lay before them a specimen of a Meteoric Stone, with a most interesting notice on the subject by Captain Fulljames,—together with a large mass of Iron found on Singhur by the Reverend Mr. Reynolds, and which had every appearance of being meteoric also. Both these had been placed for analysis in the hands of Dr. Giraud,—to whose skill, exertions, and unwearied anxiety to oblige, the Society had been so often before indebted,—and a full report on the subject would be laid before next meeting. The Meteoric stone was, in point of external appearance, identical with that formerly presented by Captain G. Wingate: the iron was of the most extraordinary toughness that could be imagined, while it bore the appearance of having been in a state of perfect fusion,—fusible iron being, so far as known to us, always brittle, tough iron never being fusible when artificially prepared. As the notice of the specimen sent

by Captain Wingate had caused the transmission of the other specimens, it was hoped that the high value set upon such things would induce gentlemen into whose hands they came, to transmit them, along with all the information that could be obtained regarding them, to the Society. The Secretary stated that he had taken care to forward all reports on these subjects to Professor Powell, who was collecting information on the subject of ærolites.

The following donations and letters were laid on the table :—

PAPERS.—By the author, through Captain S. B Haines, I. N., Political Agent at Aden.—Meteorological Observations as taken on Shum Shum and Seerah Island, at Aden, &c., for the month of October 1848. By Sergeant W. Mayes; with a letter dated Seerah, the 14th November 1848.

By the Author.—Continuation of the Narrative of a Voyage in search of the Crew of the Ship *Charles Eaton*, performed in the year 1836. By Commander G. B. Kempthorne, I. N.

BOOKS.—By Government.—Journal of the Indian Archipelago and Eastern Asia, for September, 1848, vol. 2nd, No. 9. With a letter dated 18th November, No. 4024 of 1848, from J. G. Lumsden, Esq., Secretary to Government, General Department.

By Government.—Geographical and Statistical Memoir of a Survey of the Neilgherry Mountains, by Captain J. Ouchterlony, in 1847.—With a letter dated 28th November, No. 4136 of 1848, from J. G. Lumsden, Esq., Secretary to Government, General Department.

By the Hakluyt Society, through Smith, Elder and Co., of London.—Select Letters of Christopher Columbus, with other original documents, relating to his fourth voyage to the New World, translated and edited by R. H. Major, Esq., of the British Museum. Observations of Sir Richard Hawkins, Kt., on his voyage to the South Seas in the year 1593. The discovery of the large, rich, and beautiful empire of Guiana, with a relation of the great and golden city of Momoa (which the Spaniards called El Dorado), &c., performed in the year 1595, by Sir W. Raleigh, Kt.—With a letter from Smith, Elder and Co., dated London, 19th September, 1848.

By the Medical and Physical Society of Bombay.—A complete set of their Transactions; with a letter dated 20th November, 1848.

By the Bombay Branch of the Royal Asiatic Society —A complete set of their Journals.

LETTERS.—From Lieutenant-Colonel P. M. Melvill, Secretary to Government, Marine Department, dated 18th November, No 1723 of 1848, intimating that the Society were to put themselves in direct communication with Captain E. P. Del'Hoste on the subject of a series of Tidal and Meteorological Observations, proposed to be made under the supervision of the Society at Viziadroog, &c. &c.

From Captain E. P. Del'Hoste, dated Phoonda Ghat, the 24th November, No. 220 of 1848, intimating that he had been directed by Government to place himself in communication with the Society for the purpose of setting up a Tide-gauge

at Viziadroog, stating that he was prepared to attend to the wishes of Government as soon as the instrument was ready, and requesting to address it to the care of Bappoo Kalga, if sent to Viziadroog.

From Major G. LeG Jacob, dated Sawunt Warree, the 27th November, 1848, intimating his having remitted his subscription to the Society, and expressing his wish that a proposition might be submitted to the Committee to allow of commutation of subscription being made by payment of a fixed sum, instead of an annual subscription, which he considers would be more advantageous to the Society.

Major Jacob also inquires whether the Society could not do something to benefit Members in what he considers a matter of one of their greatest wants, viz., Maps of India of the several portions that have been surveyed. As the Chief Engineer's and Quartermaster-General's Offices have a valuable store, it is suggested that Government might, if no political objection to it existed, on application permit them being copied, and the Society's copies might afterwards be made available for such of its Members as would pay the expense of a draftsman at some 30 Rupees per month.

From Corporal Robert Leach, H. M.'s 22nd Regiment, dated Bombay, the 29th November 1848, offering his services for employment in charge of the Tidal and Meteorological Observations at Kurrachee, Viziadroog, or elsewhere, under the superintendence and direction of the Society,—forwarding at the same time, copy of a letter to his address from the Astronomer Royal Observatory at Greenwich, showing his ability to fill such a situation.

From Mr. H. G. Briggs, dated Bombay, the 25th September 1848, forwarding a Prospectus of a Work, in the Press, entitled "The Cities of Gujarashtra," and soliciting the Society's subscription thereto.

From Messrs. Smith, Elder and Co., dated London, the 19th September 1848, acknowledging the receipt of a bill for £15 6s. 6d. in their favour, in liquidation of their account, and £2 2s. in payment of the Society's subscription to the "Hakluyt Society," also forwarding an invoice of the expences of the Hakluyt Society's publication, Letters of Columbus, Hawkins's Voyage, and Raleigh's Guiana.

From John Peet, Esq., Secretary, dated Bombay, the 20th November 1848, returning the best thanks of the Medical and Physical Society for the complete set of the Geographical Society's Transactions forwarded to them, and transmitting, in return, a complete set of the Medical and Physical Society's Transactions.

From Sergeant W. Mayes, dated Seerah, 14th November last, forwarding a Memorandum of the Instruments received by him from Bombay, and requesting that he might be supplied with two or three good Thermometers, &c. &c.

Note from Captain G. Fulljames, on a Meteoric Stone, accompanied by a specimen, which fell in Guzerat in 1842.

Piece of Iron, supposed Meteoric, found by the Rev. Mr. Reynolds on Singhur

A box containing Specimens of Minerals—forwarded by Dr. H. Giraud of the Grant College, Byculla, for presentation to the Bombay Geographical Society on the 14th November 1848.

From Captain E. P. Del'Hoste, dated Phonda-Ghat the 6th instant, acknowledging the receipt of the Secretary's letter dated 25th ultimo, intimating the Society's intention to put up certain Instruments at Viziadroog for the Phonda-Ghat; and with reference thereto, Captain Del'Hoste states that a Tide-Gauge could be put up at Viziadroog, but as he has no Establishment to superintend observations, and as he himself is not likely to be employed at that place, he could only afford a few days to attend to it, which would be useless for the purposes contemplated by the Society, especially not having persons to take care of and superintend them.

The following gentlemen were then admitted Members of the Society :—

Commodore J. C. Hawkins, I. N.—proposed by the Hon'ble J. P. Willoughby, and seconded by Commander G. B. Kempthorne, I. N.

J. Dickinson, Esq., I. N.—proposed by Captain H. B. Lynch, I. N., and seconded by Commander C. W. Montriou, I. N.

J. J. Waterston, Esq., I. N.—proposed by Commander G. Jenkins, and seconded by Commander C. W. Montriou, I. N.

Dr. H. Giraud—proposed by the Hon'ble J. P. Willoughby, Esq., and seconded by Commander G. Jenkins.

Professor J. Patton—proposed by Dr. G. Buist, and seconded by Commander G. Jenkins.

It was proposed by Captain Montriou, seconded by Captain Lynch, and agreed to unanimously—That Mr. Waterston, Professor Patton, and Dr. Giraud, be elected members of the Sub-committee on Tidal and Meteorological Observations.

The Secretary stated, in reference to a conversation which had taken place at last meeting on the information that might be obtained by the Officers of the *Mahi* in the course of her survey off Bombay harbour, that he had drawn up a Memorandum on the subject and placed it in the hands of the Commodore, who had, it appeared, of his own accord placed a memorandum on the subject in the hands of the officers of the *Mahi* in all respects similar to that of the Society. The Commodore had expressed his acknowledgments for the trouble taken, and his satisfaction at knowing that he had been acting in accordance with their wishes before being aware of their nature.

The thanks of the Society were directed to be conveyed to the donors for the donations above enumerated : and after the usual vote of thanks to the Chair, the meeting was adjourned to the third Thursday in January next.

The ordinary monthly meeting of this Society took place in their rooms, Town Hall, on Thursday the 18th January, at 3 o'clock P. M.—the Honorable J. P. Willoughby, Esquire, Vice President, in the chair. Present: Major J. Holland;

Captain S. V. W. Hart; Dr J. Burnes, K. H.; H. Girand, Esquire, M. D.; Dr John Patch; Lieutenant A. D. Taylor, I. N.; J. J. Waterston, Esq., I. N.; Professor J. Patton; and Dr G. Buist, Secretary.—The following papers, books, letters, &c., presented to the Society since last meeting, were laid on the table:—

PAPERS.—By the author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations, as taken on Shum Shum and Seerah Island, at Aden, &c., for the month of November 1848. By Serjeant W. Mayes; with a letter dated Aden, the 14th December, 1848.

By Captain Newbold, Madras Army.—On the Site of Hai, or Ai, a Royal City of the Canaanites; with a notice of those of Nob, Azmaveth, and other Cities of Benjamin; the "Mount of the Amalakites," &c.

By Commander G. B. Kempthorne, I. N.,—being a continuation of the "Narrative of a Voyage in search of the Crew of the Ship *Charles Eaton*, performed in the year 1836" by the H. C. Brig *Tigris*.

BOOK—By Government—Journal of the Indian Archipelago and Eastern Asia, Vol. 2d, No. 10, for October 1848.—With a letter from J. G. Lumsden, Esquire, Secretary to Government, General Department, dated 10th January, No 102 of 1849.

LETTERS.—From Messrs Smith, Elder and Co., Booksellers, London, dated the 25th November 1848, intimating that, in compliance with the Society's request, they had dispatched per Ship *Sophia Moffat*, to the care of their Agent, Mr J. Turner, a package containing the following books:—Erman's Travels through Siberia, Ross's Antarctic Voyage, and Belcher's Voyage of H. M. Ship *Samarang*.

From Captain E. P. Del Hoste, No. 235, dated Phoonda-Ghaut, the 12th December 1848, acknowledging the receipt of the Society's communication of the 5th idem, and stating that, as it appears clear that a regular establishment is required both at Viziadroog and Phoonda-Ghaut, to carry out the vews of the Society relative to the Tidal and Meteorological Observations at those places, and as his employment there is of a temporary nature, it would be impossible for him to undertake the superintendence of the Instruments. Captain Del'Hoste also remarks that the Society is in error in supposing that he has a fixed establishment at the Phoonda-Ghaut—the only establishment that he possesses being required to move about with him, which consequently renders any assistance from it unavailable.

From Serjeant W. Mayes, dated Aden, the 14th December 1848, intimating his having forwarded the Tidal Observations for November 1848; also a copy of a Map of Aden, with two Tide-Gauges laid down upon it, to point out their positions: together with two pencil sketches of the two Observatories. Mr Mayes at the same time requests the Society to furnish him with two self-registering thermometers—one for Shum Shum and the other for Seerah.

From Gunner Robert Scott, of the Artillery, dated Ahmednuggur, the 29th December 1848, offering his services to the Society, in consequence of his having noticed in the *Bombay Times* of the 23d idem, that additional Observers would be required at several stations for the purpose of taking Tidal observations, &c.

From A. Miles, Esquire, dated The Admiralty, 18th November, 1848, acknowledging the receipt of the Society's letters dated the 15th and 30th Sept. last, respecting the scheme of Tidal and Meteorological Observations, and intimating that Sir Francis Beaufort had consulted Colonel Sabine on the subject, and that the entire question, with the decision of the former Board of Admiralty, was then before their Lordships, but as no determination had been come to on the subject, the instruments had not been ordered. Mr Miles, however, states that whenever the matter shall have received their Lordships' attention and decision, the Society may be assured of his best efforts to carry their wishes immediately into effect.

From Commander G. Jenkins, I. N., dated the 15th January 1849, forwarding a communication to his address from Captain G. E. Ashburner, commanding a detachment of the 8th regt. N. I., at Porebunder, dated the 3d idem, offering his services to the Society in the superintendence of Tidal and Meteorological Observations at that place.

The minutes of last meeting, held on the 21st December, having been read and approved of, the business then brought forward, but which could not be got disposed of for want of time, was taken up.—In reference to the letter of Major Le Grand Jacob, it was agreed that an alternative should be added to the rule in reference to subscriptions, and that members should be admitted on a single composition payment of Rs. 100, or on an annual payment of Rs. 15, at their option.—In reference to the proposition made by the same gentleman for copying Maps in the possession of Government, it was stated that Government were at all times willing to allow copies for service purposes to be made of any of the maps not placed under special restriction, or desired by the Court of Directors to be kept unpublished, and that such could at any time be had on application, provided the expence of copying was defrayed by the applicant. Government would be equally willing to allow copies to be made for lithographic as for other purposes; and where two or more parties might chance to apply, the expence would be greatly reduced. A special application for the particular map wanted was considered indispensable.—A letter was read from Captain Del'Hoste, in reply to that sent him on the subject of meteorological researches at Viziadroog and in the Phoonda-Ghaut, from which it appeared that that officer's hands are much too fully occupied, and his position too remote from the sea coast, to enable him to render the Society the assistance he otherwise might have given. On this subject it was stated that no answer had been received from Government in reply to the Secretary's letter accepting of the use of the instruments offered them,—the appointment of Corporal Leach to Viziadroog,—or the occupation of the ante-chamber of the Society's rooms for the purpose of spreading maps and charts: it was explained, at the same time, that the delay had been occasioned from references merely, and that answers might be looked for as quickly as it was possible to have them given.—The Officer in charge of the Observatory was directed to be written to reminding him that no reply had been received to the letter addressed to him on the 22nd ult., soliciting permission to have extracts made from the records of the Observatory for the purpose of reference, the whole scheme being one of comparative rather than of local observation.—The Secretary was directed to write to Captain Ashburner, gratefully thanking him for his offer, of which the Society would be most happy to avail

themselves. The Secretary was directed to arrange for the supply of instruments to Captain Ashburner, and to take charge of other details,—Mr. R. Scott was desired to be written to, thanking him for his offer, but stating that observers for Vizia-droog, Porebunder, and Kurrachee, had already been secured: the Secretary would communicate with him should occasion present, so soon as observatories at other stations were organized.—The valuable papers of Capt. Newbold and Commander Kempthorne were directed to be printed.—Dr Giraud then read a very interesting report on the Meteoric Stone found by Captain Wingate near Dharwar in February last, and that lately sent by Captain Fulljames from Goozerat. Both contained nickel, chorium, and the other materials characteristic of meteorolites, and both in all respects conformed exactly with the descriptions given of these bodies.—Dr Giraud also read a report on the Meteoric Iron found on the slope of Singhur Hill near Poona by the Revd. Mr Reynolds. At first he was uncertain as to its character: on further examination the usual proportions of nickel, with nearly all the other characteristics of such bodies, made their appearance. The two reports were illustrated by specimens, and explanations of the methods resorted to for detecting the ingredients sought for. Both were of the utmost interest, and were directed to be printed in the Transactions of the Society.

The Secretary stated that the Aden observations were now in process of preparation for the press, but that some time would be occupied, the whole requiring to be transcribed before being fitted for the printer's hands. The Barometric turning-point observations in particular had been entered uncorrected for temperature: this involved the correction and transposition of about twenty thousand figures,—or about four thousand four hundred entries of five figures each. Each set of turning points had, besides, been recorded on a separate schedule; so that there were three or four schedules for each day. Hereafter, delay would be avoided, as schedules and directions had been forwarded, by which Mr. Moyes would be able to make his corrections on the spot, and to register his observations at once in the form required for publication. The whole promised to yield results of the very highest interest, and not involving greater labour than any amateur would willingly incur.

The Society then adjourned till Thursday the 22nd February next.

A meeting of the Committee on Physical Research took place just after that of the Society—Major Holland in the chair. Present—Professors Giraud and Patton, Mr Waterston, and the Secretary. The only subject before them was the progress of arrangements for publishing their observations; and the application to Government for a portable magnetic observatory for Mr Mayes. The Chairman stated that the Committee had not till then been aware that there were portable observatories in readiness to be sent out to those willing to use them, otherwise there could have been no hesitation in recommending Mr Mayes's application being forwarded to Government. The Committee was apprehensive of involving Government in further expence before any results had been published of the researches already undertaken. Mr Mayes stated that he had been duly instructed by Mr Orlebar in the use of magnetic instruments, and had been on the point of receiving in charge in 1846 the instruments now asked for. He belonged to the same

class of men that had originally been proposed to be entrusted with them, and no man could have evinced more zeal than he had done in the discharge of his duties. Besides conducting a series of tidal and meteorological observations for some years, he had fitted up a transit, and provided himself with a telescope and chronometer for active purposes, and made a very large number of most valuable observations. It was agreed to unanimously, that the Secretary should be directed to address Government under the Marine Department, applying for the use of the portable magnetic instruments at the Colaba Observatory not now in use.

THE Ordinary Monthly Meeting of this Society took place in their Rooms, Town Hall, on Thursday the 22nd February, at 3 o'clock P. M.—Present : The Hon'ble J. P. Willoughby, Esq., Vice-President, in the Chair ; Lieut.-Col. N. Campbell ; Dr J. Burnes, M. D., K. H ; Dr J. W. Winchester; the Revd Geo. Pigott ; Norman Oliver, Esq. ; Capt in S. V. W. Hart ; Dr John Patch ; Professor Joseph Patton ; Dr E. Impey ; Dr M. T. Kayes, M. D. ; Major J. Holland ; Captain H. J. Barr ; Captain H. Gribble ; Ali Mahomed Khan, Esq. ; Munmohundass Davidass, Esq. ; and Dr Geo. Buist, Secretary.

The minutes of last meeting held on the 18th January, having been read and approved of, the following papers and letters were laid on the table :—

Papers.—By the author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations, as taken on Shum-Shum and Seerah Island, at Aden, &c., for the month of December 1848. By Serjeant W. Mayes.

By the author, through the Hon'ble J. P Willoughby, Esq., Vice President, with a letter dated 3rd February 1849.—A Paper on, and two Charts of the Gulf of Cutch, dated June 1848. By Captain G. Fulljames.

By the author.—On the supply of Maps by the Society, expressing his willingness, under certain circumstances, to take charge of Meteorological Instruments. By Major G. LeGrand Jacob.

By the author.—On certain interesting Meteorological Phenomena visible betwixt Bombay and Aden on the 23rd January, the same day on which a violent thunderstorm occurred at Delhi, and heavy rain fell on the Chenaub and Jhelum, and at Lahore. On the 22nd an Earthquake was felt at Calcutta. By Commander G.B. Kempthorne, I. N.

Books.—By Government.—Journal of the Indian Archipelago and Eastern Asia, vol. 2nd, No. 11, for November 1848. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 30th ultimo, No. 275 of 1849.

Letters.—From A. Malet, Esq., Chief Secretary to Government, Separate Department, dated 22nd January, No 32 of 1849, acknowledging the Society's letter dated the 26th December, No. 62 of 1848, and complying with the Society's request to be allowed to use the walls of the Lobby of the Town Hall, opposite the entrance of the Society's Room, for the purpose of hanging the Maps, Charts, and Diagrams, belonging to them, on the conditions specified in the 2nd para of the Society's letter.

From J. G. Lumsden, Esq., Secretary to Government, General Department, dated 30th January, No. 237 of 1849, presenting to the Society the Model of the Phoonda-Ghaut constructed by Captain E. P. Del'Hoste, which is to be considered at the disposal of Government if it should be hereafter required.

From Commander C. W. Montriou, I. N., dated 30th January, No. 7 of 1849, in reply to letters from the Society of 22nd December and 22d January, stating that as the Observatory Reports were now passing through the press, they were not available for the purpose of supplying the Society with extracts—when printed, the Society would be supplied with copies : and intimating that any person deputed by the Society might be permitted to take a copy of the tracings of the Tide-Gauge.

From Captain H. Gribble, dated 7th February 1849, requesting permission to obtain from the Society, on loan or purchase, a Transit Instrument belonging to them, but not in use, and any other Astronomical Instruments they might have to spare.

From B. Powell, Esq., dated Oxford, the 27th December, 1848, acknowledging the receipt of several numbers of the *Bombay Times*, and intimating that the points of information therein contained relative to Meteoric Phenomena, are extremely valuable and interesting, and expressing a wish that he might be favored in future with similar intelligence, for the purpose of being embodied in a permanent record in the reports of the British Association.

From J. Caldecott, Esq., dated Bombay, the 14th instant, intimating his willingness to furnish returns of the Observatory made at Trevandrum for the past, present, and future, years, and that noted in the " Desiderata." Also expressing his readiness at all times to afford any information in his power from Trevandrum.

In reference to the letter of Captain Montriou, it was stated that the following were all the extracts that were desired from the records of the Observatory :—

" DESIDERATA to permit of a comparison betwixt the Meteorological Phenomena making their appearance at different places in India.

" *To determine the type of the climate for the year.*—The Means of the Monthly Barometric Readings read both up and down and across the table, so as to give the means of each hour, and the means of each day, of the Month.

" Ditto ditto for the Dry and the Wet Thermometer.

" A general note of the state of the Winds.

" *For the anomalies.*—Reading of the Wet and Dry-bulb Thermometer, and more especially of the Barometer, for from 10 to 36 hours, or as long as any irregularities made their appearance for the days subjoined. If the instruments were not in any way affected at the periods referred to, it will be enough to notice the fact, without copying the readings :—

" February 7 and 8; March 19 and 22; April 6, 19, and 25 ; May 1, 8, 15, 19, 26, and 27 ; July 20, 24, and 25 ; October 6, 19, and 28; November 5, 8, 11, 17,

and 28; and December 4, 9, 10, 21, 24, 26. With any other extracts when the instruments are much disturbed."

The following extracts from the various letters received from Government showed the interest taken in the subject, and the anxiety of the Right Hon'ble the Governor-in-Council to forward the views of the Society :—

Letter 6th June 1845, No. 871.—The Government of Scinde, and the Political Agent at Aden, have been respectively addressed on the subject of establishing a system of Tidal and Meteorological Observations at Mandavee, Kurrachee, and Aden, and the intention of Government intimated to render any assistance that may be required to carry out the object in question.

Letter 448, of April 1846.—You will convey to the Geographical Society the thanks of the Hon'ble the Governor in Council for their interesting communication, and express the desire of Government to afford the scheme of concerted Tidal and Meteorological observations which has been propounded, the most effectual co-operation in its power. * * * * If agents can be found, the Government will endeavour to make their services available, and to construct or appropriate for their use such buildings as may be wanted. And when the scheme is fairly established, under the guidance of the Society, the Government will make over to them the services of Serjeant Mayes, together with a record of all the observations he may previously have collected at Aden.

Letter No. 1660 of 19th November 1847.—The Hon'ble the Governor in Council is pleased, as an experiment, to intrust to the Geographical Society the superintendence and printing of the Tidal Observations now in progress at Bombay and at Aden, as well as those which may hereafter be instituted. * * * * * * Should the Society hereafter find it requisite to depute an agent to superintend the erection of the observatories, the Governor in Council will allow him a free passage in any Government vessel bound to the place selected for him. * * * * In thus communicating to you the intentions of the Honorable the Governor in Council, I am clearly to intimate, that although Government confidently hopes that under the care and supervision of the Society the experiment will prove successful, should the reverse unfortunately occur, some other arrangement will be substituted.

Letter No. 725, 3rd May 1848.—* * * That the Right Hon'ble the Governor in Council will undertake the expence of printing the Tidal and Meteorological observations, leaving the supervision in the hands of the Society as an experimental arrangement.

Letter No. 121, 27th January 1848.—That the Governor in Council is of opinion that it will be most convenient to all parties that the Geographical Society be placed in direct communication with the officer in charge of the Observatory, and with Captain Haines at Aden, under whom Mr Mayes can conduct the duty assigned therein. Both these officers will accordingly be instructed to attend to the wishes expressed by the Society in all matters relating to the Observations, and to afford every information and every aid in their power to facilitate and bring to a successful issue the progress of this important and highly interesting undertaking.

It was stated that Captain Montriou must needs be under some great delusion as to the wishes of the Society, and the views of Government, or he never could have written such a letter as that on the table. The Secretary said that he felt certain that any of the native assistants would in a week's time have willingly made all the extracts desired, had he been permitted, before the records quitted the Observatory: the fact of their being in the printer's hands would have facilitated reference to all that was wanted, and not the slightest interruption would be occasioned to the printing, or damage to the records. The Secretary said that as there must be some mistake, he had drafted a letter for Captain Montriou on the subject—another had been drafted for Government, to be forwarded only in the event of Captain Montriou persisting in his present purposes. It was remarked that Captain Montriou had already taken six weeks to reply to a letter which might have been answered in half an hour: that Government had on the 18th of November written to the Society, in reply to theirs of 1st September, intimating that they could immediately provide instruments such as were required,—offering them the use of two tide-gauges; and that this had been immediately replied to, accepting the tide-gauges on the terms on which they had been offered. Two months and a half had expired betwixt receipt of this and the dispatch of that to which it was an answer, and two months more had now elapsed, and they had heard no more on the subject, so that at this rate they might look for the next reply to the letter proposed to be written some months hence. Either of the Society's previous letters might have been answered in an hour's time. The Secretary was directed to address Government at once on both points, so as to come to an understanding on the subject.

The Secretary stated that he was proceeding rapidly with the preparation of the Aden observations for the press.

The Secretary stated that besides the two tide-gauges offered by Government, he would most willingly place two others, with the use of all the instruments he possessed, at their disposal, rather than that further delays should occur: as much time had been occupied in writing memorials and circulars on the subject—all ending in nothing—as would have been required to pass the observations through the press. He stated that to obviate the risk of further delays and disappointments, he had provided instruments and erected a little observatory of his own, which, though inferior to a highly organized and endowed establishment like that at Colaba, would meet the risk of such contingencies as that they were now contending with. The Hydrographer for the Admiralty stated in November 1845 that he expected him (the Secretary) to take out with him to India the instruments they undertook to provide, the grant of £300 being at once placed at their disposal. He had declined availing himself of this until he knew the views of the Bombay Government.

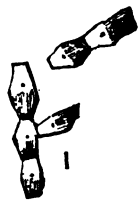
Captain Gribble's request for the use of the Society's Instruments was directed to be complied with so soon as the transit was put in suitable order: a list of the other instruments belonging to the Society was directed to be made out.

The Secretary was instructed to provide a glass case and stand for the Model Map of Phoonda Ghaut, constructed by Captain Del'Hoste, and presented by Government.

In the paper by Capt. Fulljames, on the Present State of the Seaboard of the Runn of Cutch, and the inaccuracies of the maps and charts of the Runn, it was stated that a boatman had assured him that some fifteen or twenty years ago he and some others had found a large quantity of bones, which the natives believed to have been those of giants: they were described as being as hard as stone, and had from this been inferred to be fossil. One, believed to be an arm bone, measured, from the elbow to the wrist, above five feet. Captain Fulljames said he thought it probable they might have been the remains of some extinct marine animal. The Secretary was directed, in thanking Capt. Fulljames for his paper, to request him, if possible, to obtain specimens of the bones. He was one of the first who had supplied the British Museum with fossils from Perim, and the task might therefore with peculiar propriety be committed to his hands. It was difficult to imagine any limb of the enormous dimensions spoken of, at all resembling a man's arm, to have belonged to a marine animal: to whatever animal it belonged, the specimen, if truly described, must be considered stupendous.

In laying the letter of Captain Kempthorne before the Society, the Secretary stated that something similar to this had been met in with by him in 1840, of which the following notice had already been printed:

"In May 1840, when about one-third across, the aspect of the sea suddenly changed upon us,—and at once seemed as if oil had been poured upon its surface. It was still as a millpond, and of a brownish soapy hue. The water on being examined was full of little fibrils—like horse-hair cut across, in lengths of the 10th of an inch or so. A wine-glass full of it contained hundreds of them. The accompanying diagram exhibits the aspect presented by them under the microscope. They were to all appearance spawn, or creatures of some sort in an embryotic state. I kept them for days, in hopes that they would develope themselves, and drew up fresh specimens of the water so long as it remained discoloured. But no symptoms of life were manifest, and decomposition speedily ensued. In the dark they were not luminous. We sailed through them for about five hours, so that they probably extended over a surface of 500 miles:—what myriads of living things were there! The officers of the ship told us that similar appearances were not unusual; and that one much more remarkable than this was sometimes to be observed, when the sea seemed for hundreds of square miles white and milky, so that it was at times difficult to believe that the vessel was not on the point of getting aground."



In all likelihood the luminous appearances in the sky described by Captain Kempthorne was merely the reflection by the clouds of the light from the sea.

It was a curious fact, that on the same day an earthquake had been felt at Calcutta,—a thunderstorm had occured at Delhi, and heavy rain fallen all along the line of the Jhelum and Chenaub from Rhotas to Mooltan. It was very possible that these phenomena might bear no relation whatever to each other; but whenever such coincidences occurred, it was proper that they should be remarked: connections might by and bye come to be traced betwixt them which at present were not suspected.

The Barometer at Aden seemed not to have been in any way materially affected. At Bombay and Calcutta the mercury stood unusually high from the 19th to the 24th, as it probably did at all other places in India.

22nd January.	Maximum.	Mean.	Range.
Bombay.....	30·019.....	29·897.....	·122
Aden...	30·163.....	29·971.....	·192
Calcutta.....	30·126.....	30·008.....	·118

This was after making the correction for the difference of altitude betwixt the two observatories, amounting to about 152 feet,—Aden being 187, and Bombay 35, feet above the sea. It might here be remarked, that the barometer at Aden had sunk materially on the 5th and 6th, the very days it in like manner fell at Bombay. It was for the sake of endeavouring to trace the connection of phenomena of this description with each other which made the Society so anxious for access to the records at the Observatory. There might in reality be nothing very remarkable in the fact that a violent thunderstorm should have happened at Bombay, with earthquakes up and down the country, on the 26th May; or that a heavy fall of rain should have occurred on the 15th January; but there was something very striking indeed in the occurrence of these things at the same hour of the same day all over India, from the Himalayas to Cape Comorin. On the storm first alluded to, a most interesting paper had already been laid before the British Association by Colonel Sykes, and from the tenor of Professor Powell's note, it was unlikely the second would be passed over unnoticed.

"*Moozuffer, 25th January*, 1849.—I cannot permit this opportunity to pass by without describing to you, in the best way I am able, a most extraordinary phenomena which we all witnessed on the night of the 23rd instant. It would indeed require a far abler and more scientific pen than mine to do justice to it—however, I hope you will take the will for the deed, and pardon all imperfections. At 6-30 P. M. observed a very remarkable milky appearance in the water, the color assuming the same tint as a shallow mud-bank or sand-bank. The sea, which had a few minutes before been turbulent and confused, suddenly became smooth and placid, and the air felt cold and chilly. In the space of an hour the whole verge of the horizon, as far as the eye could reach, was most brilliantly illuminated. The vessel shortly after entered a vast body of water of the most dazzling brightness, and of a highly phosphorescent nature; in fact it looked as if we were sailing over a boundless plain of snow, or a sea of quicksilver. The surface of the ocean for miles in extent was unbroken—not a wave or riple disturbed it, and the waters seemed so dense and solid, that the *Moozuffer* actually appeared as if she was forcing her way through molten lead. That part of the surface which was broken by the stroke of our huge paddle-wheels, resembled small patches of thick milk or cream. The sky, and everything around us, was quite lighted up by it. The weather was peculiarly fine, though the atmosphere was damp and moist: the wind was light from the N. W., stars over head clear and light, but those of a lesser altitude were rendered dim by a haze. The horizon nearly the whole time was dark, and ill-defined; a few thin cumuli, floating very low down, occasionally swept past; but no other peculiarity in the atmosphere could be perceived until about ten o'clock, when a singular light was seen in the

heavens to the northward, as if day was dawning, or the full moon was either setting or just rising. It strongly resembled a faint Aurora Borealis, being of a roseate tinge near the horizon, and was a steady fixed light, but without those corruscations which are usually observed in the higher latitudes. It extended along the horizon in the form of a segment of a circle from N. W. to N. E., and the altitude of the centre of the arch was 15°. It continued visible until a few minutes after midnight, when it disappeared as suddenly as it appeared, and the sea about the same period lost also its luminous quality. The light in the heavens, and the lightness of the sea, were, however, again seen for about ten minutes at two A. M., when both became once more invisible. The horizon, except where the light appeared, was everywhere dark and indistinct, and could not be made out: the sky and sea were apparently blended together. The phenomena was altogether as beautiful as it was extraordinary. I could have stood on the deck gazing at it the whole night, and should not have felt fatigued. There was something grand and sublime in such a scene as I have faintly endeavoured to pourtray. No language of mine could ever do justice to it. We were upwards of six hours in passing through this vast body of luminous water, and during that time we ran a distance of upwards of forty miles. Our Lat. on first entering it was 16° 13′ S., and Long. 61° 51′ E., so that our position was exactly abreast of the entrance to the Persian Gulf, and in the fair channel to the Red Sea. From the fact of our having seen immense quantities of sea-weed floating past whilst in this luminous water, I should conclude the accumulation of this and other decayed matter, whether vegetable or animalculæ, was the sole cause of this phosphorescent appearance; and that all this matter might have been swept out of those narrow seas by strong currents, which meet no doubt about this spot: and I am still more inclined to believe this is the case, as a luminous stream of water has often been noticed nearly in the same Lat. and Long., and about the same season of the year. I saw it once in the *Victoria*, when I commanded her in the month of January 1842, whilst on our voyage from Aden to Bombay; but the sea was not nearly so bright then as this time. The color of the water so strongly resembled a shoal that I stopped the engines, and took several casts of the lead, but could get no bottom with 80 fathoms of line. Several buckets of water were drawn up by Dr Wilson, of the *Moozuffer*, but nothing whatever could be seen. It seemed as clear as crystal: on taking a bottle of it, however, in the dark, it became highly phosphorescent, giving out a strong light. It was full of animalculæ: some were in the shape of most minute globules of gelatinous substance, and others were not unlike small worms, about an inch in length, and about the size of a fine hair. On removing the bottle to the light, the animalculæ became instantly invisible. The light seen in the heavens I cannot account for, unless it was the low fleecy clouds which hung on the verge of the horizon that reflected back the brightness of the sea; but why the whole sky should not have assumed the same appearance, I cannot imagine. It continued to shine in one spot only, and disappeared at the same time the sea lost its brilliancy. I send you an extract of the log in which the luminous appearance in the sea and heavens is noticed:—'At 6-30 P. M., passing through an illuminated sea: the sea also became suddenly smooth, with quantities of sea-weed floating by. At 10 an extraordinary luminous appearance to the northward, as that of a full moon rising or setting: the water of a

thick white; with a very dark horizon: wind N. W.—hazy blue sky, with passing clouds.' "

"*January 25th.*—I have looked at the bottle of sea water, but its luminous appearance is entirely gone. The animalculæ, I suppose, are dead. This clearly proves that they must have been alive when drawn up in the bucket : the three days in the bottle have killed them I fear."

The following motion was made by Dr Burnes, seconded by Major Holland, and agreed to unanimously :—

" That in consideration of the zeal for the advancement of science and the impulse given generally to scientific pursuits by Captain Inglefield, R. N., that gentleman be admitted an Honorary Member of the Society."

Dr Burnes proposed Dr B. A. Bremner as a member of the Society, which was seconded by Colonel Campbell, and agreed to unanimously.

Capt. Gribble proposed Lieut. Foulerton, I. N., which was seconded by Dr Burnes, and agreed to unanimously.

The Meeting then adjourned.

The Meeting, which was an unusually full one, would have been still more numerously attended but for the Court Martial on Commander Ball, by which a number of the officers of the Indian Navy were detained.

THE ordinary monthly meeting of this Society took place on the evening of Thursday the 22nd March, at 3 o'clock. In absence of the Honorable Mr Willoughby, Major J. Holland—the senior member of the Society present—was called to the Chair. The following members were present:—the Revd G. Pigott; Professor Joseph Patton: Dr B. A. Bremner; Captain S. V. W. Hart; Captain H. J. Barr; John Smith, Esq.; and Dr G. Buist, *Secretary*. Visitor—Mr J. E. Winterbottom.

The minutes of last meeting having been read and approved of, letters were read—

1. From Captain Del'Hoste, stating that as he found he would require to spend the coming monsoon at the Phoondah Ghaut, he would be happy to assist to the utmost of his power in carrying out the views of the Society on the subject of meteorological observations on the Ghaut, and tidal observations at Viziadroog.

2. From Captain Ashburner, in reply to the Secretary's letter, intimating his willingness to conduct the observations at Porebunder.

3. From Captain Montriou, stating that there were no magnetic instruments not in use in the Observatory such as were desired for Mr Mayes.

4. From Captain Montriou, stating that there was a transit and a telescope in the observatory, which stood in their lists as belonging to the Geographical Society, and that these would be made over to them on evidence being produced that they belonged to them,—otherwise Government would be required to be addressed on the subject.

5. From Captain Montriou, accompanying the printed Tidal Observations for 1846-47-48, which he had been permitted by Government to send them.

6. From Messrs Remington and Co., enclosing copy of the Society's accounts for the year 1848,—showing a balance in their favour of Rs. 3014.

7. From Government, stating that the services of Corporal Leech could not be obtained, as the Home authorities were averse to permitting soldiers to be employed in other than military duties.

8. From Mr Mayes, in reference to the observatories under his charge, with turning-point corrections for January, February, and March, 1848 : these were stated to have been formerly forbidden to be made by him.

9. From Captain Del'Hoste, intimating that he hoped soon to be able to furnish the Society with a geological account of the Concan from Viziadroog to Malwan, together with specimens and sections to illustrate his model Map of Phoondah, in the possession of the Society.

10. From Colonel Sleeman, Resident at Lucknow, in reply to the letter of the Secretary, stating that it would give him the greatest pleasure to see and obtain from the Observatory of the King of Oudh the extracts and documents required. Colonel Sleeman adverted to a point of much interest to meteorologists, and which did not appear to have met with the attention it deserved—that of the due classification of local winds with the fluctuations in the fall of rain discernible at different times in different quarters of the country. Colonel Sleeman observes :—

"There is one very interesting and important subject connected with this branch of science that has not, as far as I know, been sufficiently noticed by scientific men in India—the prevalance of different winds in different parts. Last year in replying officially to some enquiries about rain, and the causes of its increase and decrease in different parts, I mentioned to the Sudder Board of Revenue N. W. Provinces, that westerly and south-westerly winds prevailed not only during the hot winds, but during the rains over Malwa, and the countries extending north from Nagpoor to Gwalior, bringing up moisture from the Gulf of Cambay, and descending into the valley of the Ganges ; and that this tract was in consequence much better supplied with rain in due season than Rajpootana. That at the season when these winds prevailed over this tract, easterly winds prevailed over the tract extending up from the Bay of Bengal along the valley of the Ganges, and under the Himalayah chain, bringing up moisture from the sea over that tract. I suggested, that Government should be moved to require all Political officers in Native States to keep rain-gauges, and notices of the prevailing winds, and forward monthly reports to the Sudder Board, by whom they might be collated and condensed, with a view to elicit useful information on this most interesting subject. * * * * * * *
You might invite the attention of the public to the question, and thereby lead to useful and interesting discoveries. I am persuaded that India is indebted to the prevailing winds from the sea for much of its fertility, and that the tracts over which these winds blow have more rain in due season than others less favoured. In order to give the land the full benefit of these prevailing winds from the sea, it is necessary that they should be well provided with foliage, and studded with well-

wooded hills, to attract the moisture from the atmosphere. This is the case with Malwa, which is the most favored tract in India, I believe, above the Nerbudda, except that of the valley of the Ganges, and the tract between the Ganges and the chain of the Himalayahs, which draws so largely from the moisture brought up from the Bay of Bengal. I do not recollect ever having read any speculations on the subject of these prevailing winds, as regards India ; nor have I ever heard any one speak of them ; nor am I aware that any one but myself has noticed them,—except those who keep boats on lakes and rivers, who calculate upon them as conducive to their amusements in sailing."

Several letters of very great interest from Dr Ford, at Hoshungabad, were laid on the table. The following is an extract from one of them :—

" By the end of next month I hope to have three Barometers at work, and I purpose to institute a rigid comparison between their indications and Wollaston's Thermometers. I very strongly suspect that their respective fluctuations do not entirely depend upon atmospheric pressures purely, especially as relate to the Thermometer ; but that the temperature of water is influenced to a great degree by the quantity of electricity present in the atmosphere. It is however a very delicate enquiry. and I much fear far beyond my mental capability for such research. I can only offer my suspicion of the cause : that there is at present an irreconcilable discrepancy, I cannot doubt.

" We have had lately rather extraordinary weather, and the latter half of February different from what I have hitherto experienced here. It was close, hazy and dry—and a similar state of matters has continued to this day (16th March.) Last evening the clouds began to collect, the atmosphere having been *highly* charged with electricity for four days, the electrometer (Cavalla's) readily indicating the amount, and the least friction causing considerable excitation. Pressure and dryness have somewhat increased, and I cannot therefore augur rain at present, but either another *earthquake* or a thunder and dust-storm. On the 20th of last month we had half a gale blowing the greater part of the day, the mean of Barometer having descended in three days from 29·949 to 29·684! Prognosticating an earthquake at Hoshungabad is somewhat akin to a pig seeing the wind, but I only hint at such a phenomena from the consciousness that there is something very peculiar just now in the atmosphere, and from the fact that the instruments seem as strangely affected as the senses.

" Can you tell me the precise Lat. and Long. of Bombay ? and what formula you use to obtain the sunrise and sunset given in your journal. It is an anomaly that the geographical positions of Calcutta and Bombay, when both have Observatories, are not to be found in the Nautical Almanac ! At present with the Lat. and Long. from the Gazetteer, I do not come to the periods fixed by you for rise and set at Bombay."

The following extract indicates a degree of ingenuity and dexterity in the repair of injured instruments very rarely met in with, and which, where no instrument-makers were at hand, was as valuable as it was rare :—

" On the 17th instant, I commenced my threatened project of repairing the Barometer by the addition of a well-turned piece of iron tubing to make up for

the loss caused by breaking of the glass tube—and then to fill the same with pure boiled mercury, and finally to boil the tube over a spirit lamp. I am glad to inform you that in the whole affair I have succeeded beyond my expectations, and the column of mercury stands about 28·700 as a mean—giving out bright green electrical light upon oscillation, and the sharp 'clack' of the water-hammer when it reaches the sealed end of the tube. It has ranged up to 28·862—and been as low as 28·440 when we had a storm. By its indications there is here the usual daily tide, a rise from sunset to 9 or 10 A. M., when it falls rather rapidly till about 3 P. M. For my part, I am quite pleased with the instrument: the scaling being very well and accurately marked, and the height of column agreeing so nearly with what I had expected from thermometrical calculations that I really think that its indications of pressure may be relied on. I must say, however, that I only boiled eighteen inches of the mercury, being afraid to continue the operation too long, and being aware the general opinion now with the makers is that boiling has its disadvantages by oxydising the metal. I measured the height of the bank of the Nerbudda contiguous to my compound by the Barometer the day after completing it, and by it the height is 57·632 feet, whereas the actual elevation by levelling is 55 feet 3 inches, and the discrepancy would arise from error of observation alone. I think of embodying the daily indications in the meteorological observations next month, but I shall curtail considerably the 'observations' themselves, for I observe that they occupy a great deal more of your space than I had anticipated."

The instrument in question was one of Adie's barometers: the part of the tube projecting into the cistern had been crushed by screwing the glass plunger violently against it.

The Chairman called attention to the following extract of a letter from Colonel Melvill, of 19th November 1847, from which the Society had inferred that the publication of the tidal observations at Bombay, as well as at Aden and other stations, were subsequent to the close of the year 1847 to be entrusted to their hands:—

"Letter No 1660 of 19th November 1847.—The Hon'ble the Governor in Council is pleased as an experiment, to intrust to the Geographical Society the superintendence and printing of the Tidal Observations now in progress at Bombay and at Aden, as well as those which may hereafter be instituted." * * * * * *

The tidal observations for 1848 had just been sent by Captain Montriou by permission of Government. None of the Aden observations for 1846 or 1847—stated by Colonel Melvill in a previous letter as being intended to be published along with the Reports of the Observatory—had been received. The Secretary was desired to direct attention to these circumstances, and to enquire of Government whether the Aden observations for the past were to appear in the Bombay reports, or whether the Society were hereafter to be entrusted with the publication of one or of both reports. It mattered little in a scientific point of view where the reports appeared, provided they appeared without delay; but as perfect concert was one of the principal features of the scheme of which Government had so frequently expressed their approval, it would be well were all the tidal observations to appear in one publication. The Secretary was also directed to address Government on the subject of the two Tide-gauges said to be at

the disposal of the Society so far back as the 19th November,—no answer having been received to the letters subsequently written to Government on the subject. Captain Montriou had stated that he did not consider Porebunder a suitable place for tidal observations. The Secretary said that he regretted Captain Montriou was not present, as he appeared, from his minute on one of the circulars, to have been offended with a remark he (the Secretary) had made, to the effect "that Capt. Montriou had made two minutes on the circular suggesting that Mr Mayes might be supplied with magnetic instruments, neither of them giving the least hint that no such instruments as those asked for existed under his charge; and that had this been suspected, the Society would have been saved the trouble of writing, and Government that of answering, his letter." The Secretary stated that the circular had been intended for the Special Committee, of which Captain Montriou was a member, but that it had been sent to the General Committee by a misapprehension of the purvoe: that in considering matters of so complex and intricate a nature as this, it had always appeared to them best to speak out frankly, freely, and without reserve. He had not the most remote idea of interfering with the views, or hurting the feelings, of any one, and hoped Captain Montriou would accept this explanation as sufficient.

A long conversation then took place on meteorological subjects generally, and on those particularly connected with the subject of their researches. The Secretary was directed to lose no time in supplying instruments to those willing to use them—applying to Government meanwhile for the use of such as were to be found already in their stores. These would be withdrawn if so permitted, and returned to Government so soon as they were no longer required, or would be purchased by the Society, the amount being defrayed by Government, and falling ultimately on the Admiralty's Grant. The Secretary stated that as the season was rapidly running on, it would be better to send the tide-gauges formerly spoken of to Viziadroog and Kurrachee, as it was really impossible to say when the instruments promised them by Government might become available. A large and varied series of pressure-curves, illustrating the admirable symmetry and regularity of the daily atmospheric wave, was laid on the tables of the Society. Attention was called to the very great care requisite in preparing observations of this sort for the press, and tables already printed were shewn, where six or seven errors were occasionally to be found in a single column of figures. The importance of avoiding all symbols when such could be dispensed with, was also adverted to, as the trifling saving of space occasionally secured by introducing them was more than counterbalanced by the additional expense and trouble in setting them up, and the enormous risk of inaccuracy in printing off likely to be introduced where a species of short-hand, wholly unintelligible to the compositors or corrector of the press, was resorted to.

The Secretary stated that he had written to Smith, Elder and Co., for three copies of the Guide to Scientific Research now preparing by Sir J. Herschel for the use of the Royal Navy, but was informed that it would not appear for some weeks to come. The preparation of the Manual for Observers in the Eastern Seas, directed by the Society to be proceeded with, had been suspended until the work of Sir J. Herschel should have been received. The following report was

laid before the meeting on the instruments in the possession of the Society. An account of stock was directed to be laid before them annually at the meeting of May, along with their accounts.

Report by the Secretary on the Instruments belonging to the Geographical Society.

The instruments in our repositories consist of the following:—A Dipping Circle with four Needles, by Robertson, London. One of the glasses of the circle is wanting—it could easily be replaced in Bombay. The needles are all rusty. The instrument could without difficulty be rendered serviceable—it would probably be well to have new needles from London. In this case, to prevent their rusting, I should recommend that they be coated with bees-wax, which might readily be removed on their arrival here. Slips of zinc in the box would probably prove a preventive. A dipping needle seems at one time to have been sent by the Society for use at Madras: the subject is referred to in a number of the Madras Transactions, on which at present I am unable to lay my hands. There are two Magnetic Bars along with the needles, for the purpose of induction.

Barometers.—Four Barometers are set down in our list as once having been possessed by the Society: three seem to have been given away—one now remains. It is a Syphon on the Guy-Lussac principle—cut by French measure. It has the usual fault of French instruments, and is too light and frail for field service: it seems in good order.

Thermometers.—There are two pairs of self-registering Thermometers, the maximum and minimum on the same plate. The scales are cut in centisimal degrees from 1 to 50, or from 32 to 122 of Fahrenheit. In one, the bulb of the mercurial Thermometer is broken, the other is in good order: in the other the spirit Thermometer is in good order. The steel index is entangled amongst the mercury of the maximum thermometer. This probably could be rectified, and the instrument made servicable.

Three Thermometers on wooden scales, by Robertson. The bulbs of two are broken, and the instruments useless:—the third is in good order.

One Daniell's Hygrometer in good order.

One ditto ditto broken and quite useless.

One Æthrioscope in good order—the reflector good. A Photometer—the glass cover broken.

A wet bulb Thermometer, with long scale:—the three thermometers seem fine and delicately cut instruments.

A colour box of 17 colours, 12 good and unused, and 5 used and small pieces.

The following is the only list of instruments I can find:—

4 Mountain Barometers.

1 Barometer.

2 Register Thermometers.

1 Dipping Needle.

1 Thermometer as Hygrometer.
1 Ditto as Æthrioscope.
1 Ditto as Photometer.
1 Drawing box.

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Probably a more careful examination of the minute and letter books than I have as yet been able to bestow on them might throw more light upon the subject. I observe no allusion to the Transit or Telescope which stands on the invoice of the Observatory as belonging to the Geographical Society. The same is the case with Daniell's Hygrometers—the only evidence we have that they are ours is the fact of our possessing them.

It would be well that a return of Dead Stock were made up and put on record at our annual meetings along with the state of our accounts. GEORGE BUIST.

The Secretary was directed to make further search for evidence of the intruments mentioned in the Observatory catalogue as belonging to them being their property; and in the event of failing to find this, to write to Government on the subject. Mr Pigott explained, in absence of Captain Montriou, that that officer had no choice but to adopt the course he pursued : this was fully assented to. Mr Pigott asked leave to consult the records and letter-books of the current and past year : this was at once conceded. It was stated at the same time, that every member of the Society had a right to examine whatever documents belonged to them, or to make any extracts from their records or the papers in their archives that might be desired.

List of Papers and Books presented at the Ordinary Monthly Meeting of the Bombay Geographical Society, on Thursday, the 22nd March, 1849.

PAPERS.—By the author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations, as taken on Shum Shum and Seerah Island, at Aden, &c., for the month of January 1849. By Sergeant W. Mayes: with two letters dated Aden, the 14th and 15th February 1849.

By John Macleod, Esq.—Progress of the Inundation of the River Indus, from the month of September 1844 to June 1845. With a note dated the 9th March 1849.

BOOKS.—By Government.—Memoir on the Statistics of the North Western Provinces of the Bengal Presidency. By A. Shakespear, Esq., B. C. S., Assistant Secratary to Government. With a letter from J. G. Lumsden, Esq., General Department, No. 727, dated 17th March 1849.

By Government.—Journal of the Indian Archipelago and Eastern Asia, Vol. 2nd, No. 12, for December 1848. With a letter from J .G. Lumsden, Esq., Secretary to Government, General Department, dated 22nd February, No. 518 of 1849.

By Commander C. W. Montriou, I. N., in charge of Observatory.—Tidal Observations made at the Observatory Colaba, during the years 1846, 1847, and 1848. With a letter No. 14, dated 20th March, 1849.

THE Ordinary Monthly Meeting of this Society took place in their Rooms, Town Hall, on Thursday the 19th April 1849, at 3 o'clock P. M.

Present :—The Hon'ble J. P. Willoughby, Esq., Vice-President, in the Chair. —Dr. J. Burnes, K. H. ; Major J. Holland ; Dr. John Patch ; Dr. J. W. Winchester ; Captain S. V. W. Hart ; Dr. E. Impey ; John Smith, Esq. ; Professor Joseph Patton; S. S. Dickinson, Esq.; and Dr. Geo. Buist, Secretary.

The Minutes of last Meeting, held on the 22nd of March last, having been read and approved of, the following books, papers, and letters, were laid on the table :—

BOOKS.—By Government.—The Journal of the Indian Archipelago and Eastern Asia, Vol. III., Nos. 1 and 2, for the months of January and February 1849. With letters from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 21st March and 14th April, Nos. 835 and 1140 of 1849.

By Government.—Reports of the Superintendent of Roads and Tanks, and other Engineer Officers under this Presidency, for the year 1846-47. With a letter from J. G. Lumsden, Esq., Secretary to Government, General Department, dated 26th March, No. 889 of 1849.

By the Author.—Journal of the passage from the Dharee Falls to the Hirnphal, by Captain Fenwick, (late of the Nizam's Service) in charge of 10 boats laden with coal, by order of R. N. C. Hamilton, Esq., Resident, Indore.—Communicated by order of the Lieutenant-Governor N. W. P.

LETTERS.—From Captain F. T. Powell, I. N., Commanding Indus Flotilla, No. 97, dated Raj Ghaut, the 21st March last, acknowledging the Secretary's letter, No. 59, of the 26th of December last, relative to the Tidal and Meteorological Observations, and recommending the instruments &c. being at once sent up to the care of Mr. Acting Master Tucker, in charge of the Guard vessel, who will be instructed to take charge of the same until the arrival of Captain Powell at that place ; and requesting to be supplied with full instructions, and forms of Registers to be kept to accomplish the object in view.

From Captain H. B. Lynch, I. N., dated 23rd March last, requesting to place his name on the list of absent Members of the Geographical Society from the 31st March last, from which date he begs to resign his Membership from the Committee.

From Captain C. D. Mylne, Acting Secretary Military Board, dated 28th March, No. 2042 of 1849, informing, by desire of the Military Board, that the instruments alluded to in the Society's letter No. 17, dated 27th of February last, will be made over to the Society by the officer in charge of the Observatory at Colaba on application.

From Serjeant W. Mayes, dated Aden, the 29th March 1849, acknowledging the receipt of the Secretary's letters of the 4th and 17th March last, and regretting his not being able to forward the observations for 1846-47, but informing that copies can be had from the supply he has already made to the Colaba Observatory.

From Dr. W. H. Bradley, dated Boldana, 1st April, forwarding readings taken since he reached that place, as well as those he had taken at Aurungabad about two years ago, in continuation of those of Ellichpoor already in possession of the Society, and requesting to be elected a Member of the Society.

From Major G. LeGrand Jacob, dated Sawunt Warree, the 4th April, intimating his having forwarded a year's meteorological observations taken by Annuntah Bullal.

From Commander C. W. Montriou, I. N., in charge of the Observatory, dated 5th April instant, acknowledging the Secretary's letter No. 22, of the 28th of March last, and acquainting him that two tide-gauges complete, and one Ostler's wind and rain-gauge, complete, will be delivered to the Geographical Society on their sending a responsible person to take charge of, and grant a receipt for, the same.

PAPERS.—By the Author, through Captain S. B. Haines, I. N., Political Agent at Aden.—Meteorological Observations as taken on Shum Shum and Seerah Island, at Aden, &c., for the month of February 1849. By Serjeant W. Mayes, with a letter dated Aden, the 16th March 1849.

By the Author.—Results from the Magnetic Observations made at the Magnetic Observatory, Bombay, Colaba, in 1847, under the Superintendence of Commander C. W. Montriou, Indian Navy—with a letter dated Observatory, Colaba, the 13th April, No. 23 of 1849.

By Government.—An extract para 3, from a letter from the Political Agent at Aden, dated 3rd March last, No. 20, together with an extract from a Communication from Lieut. Manners, Commanding the Hon'ble Company's Brigantine *Tigris*, of the 26th of the preceding month, connected with his visit to the ruins of Adoulis. With a letter from W. Courtney, Esq., Acting Secretary to the Government of Bombay, dated 16th instant, No. 1576 of 1849.

Extract from a letter from Lieutenant F. E. Manners, Commanding the Hon'ble Company's Brig *Tigris*, to Captain William Lowe, Senior Naval Officer at Aden, dated the 26th February 1849 :—

"In the interim proceeded with the Hon'ble Company's Brigantine *Tigris* under my command down 'Ansley Bay,' and from thence proceeded with some of the officers of the vessel into the interior, about 15 miles (inhabited by the Sahoo tribes), in order to examine and report upon the extensive ruins of the ancient Grecian City of Adoulis, and if possible to obtain inscriptions. I very much regret to state that, with regard to the latter, I have been altogether unsuccessful, but received positive intelligence that inscriptions are in the possession of the Natives ; and, I believe, had I felt myself justified in detaining the *Tigris* for about a fortnight, I am convinced I should have been enabled to have given very important information respecting the remains of a City which has hardly been visited by any European, and also obtained inscriptions.

"I have lately heard from Mr. Stephens, who accompanied us on this expedition, that a French Traveller has found two valuable inscriptions among the ruins very recently. This information is to be credited, as it proceeded from the very man who accompanied the Frenchman to the ruins, and he has buried them, as the man

stated, though he could not say where. (I questioned him myself particularly concerning them.)

"With regard to the appearance of the ruins generally, they in the first place occupy an extent of ground of about 15 miles in circumference, and are composed principally of confused heaps of stones of various kinds, with great quantities of large blocks of marble. The tombs are in an excellent state of preservation.

"The natives are exceedingly jealous of their being visited, and we were forced to return twice on that account. They are a race of people by no means to be trusted, and I believe it was owing entirely to our having fire-arms, together with a large party, that kept them at all in order. Their diet alone is milk, and they trade in salt, which they export into Abyssinia.

"The wall of the city is in good preservation, built without the use of mortar, and large enough on its top for a vehicle to be driven. It is composed of various kinds of stone, principally granite, interspersed here and there with marble, and extended from where we were some distance up the mountains; it is a place in my opinion of considerable importance, and ought to be thoroughly explored, as the history of the City of Adoulis is but little known. I however unfortunately only felt myself justified in stopping two days, a circumstance which I very much regret, as Mr Stephens said he knew the country round, and that he felt almost certain that the natives would shew the inscriptions for a sum of money, as they were even then divided before we left on that point.

"I trust you will consider this of sufficient importance to justify me in visiting them, especially as I could not leave Mussowah for Aden.

"The Indigo plant grows in abundance and wild on the hills, and the country round about is tenanted with the general description of wild animals peculiar to Abyssina.

"The soil is most luxuriant: various descriptions of very beautiful shrubs and flowers flourish in great abundance on the crests of the hills.

"I have discovered two reefs not laid down in the chart (one of a dangerous character) down Ansley Bay—even some islands and rocks are omitted in the chart also."

The following Members were elected:—

1.—Dr. W. H. Bradley—proposed by Dr. Geo. Buist, Secretary, and seconded by Major J. Holland. 2nd—The Hon'ble D. A. Blane,—proposed by the Hon'ble J. P. Willoughby, Esq., and seconded by Dr. G. W. Winchester. 3d.—Lieut. J. S. Kemball, 26th Regt. N. I.—proposed by the Hon'ble J. P. Willoughby, Esq., and seconded by Dr. J. W. Winchester.

It was stated that instructions had been sent to make a minute examination of the locality described by Mr. Manners, and that probably Mr. Cruttenden might manage to undertake a task he was so eminently qualified to perform.

The instruments received from the Observatory, in reference to which a correspondence had commenced in September 1848, were examined by the Members. They consisted of a simple Tide-Gauge, such as that made use of at Aden, and the same as those several times before examined by the Society, which had been

ordered out in 1843, and been purchased by Government in January 1846; of a pair of self-registering Thermometers, by Newman, and a large Tide-Gauge by Bunt. The wind and rain-gauge and tide-gauge last named were of large size, and beautiful construction. No drawings or account of them had accompanied them; they were completely dissected when received, not a screw or pin having been left in its place. They appeared to have been used, and on being put up again were found to be beautiful instruments, apparently in good order, with the exception of two of the springs of the wind pressure plate being absent. They were supposed to be the instruments supplied some ten years since to the Madras Government, to whom, from the packing boxes, they appeared to have been addressed, for use on the Malabar Coast, and that they had been received by the Bombay Government, in Feb. 1845, since which time they seemed to have been at the presidency unemployed. It was suggested that as rain hardly ever fell along the coasts of Cutch or Scinde, and as the Phoonda Ghaut observations were not likely to extend beyond a single year, the wind and rain-gauge should be sent to Major Jacob, Sawunt Warree. The tide-gauge was by Bunt, of Bristol: a full account of it was given in the Philosophical Transactions for 1838. It was so large and so delicate, so troublesome to remove, and was likely to incur so much expense in its fitting up, that it was considered advisable to detain it at the Presidency, where it might be employed as a standard, a cheaper instrument, which would suit as well for outstations, and not cost so much fitting up in all as would the fitting up of Bunt's instrument alone, to be sent in its place. The matter was referred to the Committee on Physical Research.

The Secretary made some remarks on the methods usually resorted to for determining heat and evaporation—stating that, though apparently simple, they were two of the most delicate and troublesome operations the meteorologist had to deal with. After giving a multitude of illustrations of this, he noticed a curious phenomenon that had made its appearance while he was engaged in investigating the evaporation from the soil compared with that from a surface of pure water. The objects and details of the experiment were as follow:—As the evaporation from a shallow dish of water exposed to the sun, and liable to be raised to a temperature of 100 or 120°, gives no idea whatever of the amount of evaporation from the surface of the sea, large pools, or lakes, which vary but little in temperature, he was anxious to determine the amount of evaporation from the surface of wet earth, compared with that from the surface of a considerable mass of water. With this view two zinc cylinders were produced, three feet in length, and four inches in diameter, and secured by a strong brass ring at the top and bottom, carefully turned. These contained fifteen pounds, or a gallon and a half of water each, temperature 82°, or nineteen pounds of the loose red earth to be found associated with trap rock. When filled with earth well shaken down, they were able to take in six and a half pounds of water before overflowing. Each was provided with a glass tube quarter-inch bore, connected with the bottom of the cylinder, and running parallel with it as its axis to the top: this was intended to show how high the water stood inside. The tubes were provided with scales divided into inches and tenths from top to bottom. On filling one of the cylinders with earth, and then adding water till it flowed over, that in the tube of course first rose to the level of that in

the cylinder, when both decreased rapidly by evaporation: but strange to tell, after continuing to descend from noon till daybreak, it commenced immediately to rise again till 11 A. M., remaining motionless till 1 P. M., when it began to sink, and so continued descending till about an hour after sunrise, when it commenced immediately to rise, and so continued till the same hour as during the preceding day. This had gone on regularly for four days—each day it sunk from two to three inches, and only rose half as much; the fluctuation was in all respects most perfectly regular and symmetrical.* For the purpose of determining the amount of evaporation from the surface of wetted earth, the water in the tube was intended to be kept as nearly as possible at the same point, but it was also desired to be ascertained to what extent capillarity acted beneath the surface of the ground. Even now, after six months of uninterrupted heat, when a thermometer on the surface of the ground would generally rise to 140, a foot under the soil was found to contain from sixteen to twenty-two per cent of water capable of being drawn off by a few hours' exposure to the sun, four or five per cent more being capable of expulsion by a temperature of 300°. It was clear from this that capillarity and conduction ceased to operate at a very short distance downwards. In reference to the latter, much information had already been obtained, and it was hoped that some new light might be thrown on the former by making the experiments under consideration—determining how many grains of vapour passed off daily as the water sank, or the rate at which reascension in the tube progressed.

It was added that these were to be considered as merely casual remarks: the perplexity might vanish, or the apparent wonder turn out to be no wonder at all, the next step that was taken—or perhaps it might be a thing perfectly well known. Those engaged in physical research in the colonies, and more especially in India, laboured under the disadvantage of want of books, and ignorance of what was doing, or had been done, by others. They had only to choose betwixt making attempts, of which the worst that could be said was that they were useless, having been successfully performed before, or proved hopeless or visionary altogether—or rest in indolent despondency of accomplishing anything, when numberless tasks of importance were around, for fear of doing what was superfluous, or being reproached for an ignorance there were no means of remedying. No tolerably industrious man would under the circumstances hesitate which course to pursue, for fear of being reproved for the want of knowledge, which was not his fault, but the misfortune of his position.

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* A second vessel of the same size and form has since then been fitted up, with exactly the same results. The two keep together like a pair of well-going chronometers. On Sunday morning, the 15th April, when the air was unusually damp, and a strong south wind blew, all movement was suspended from dawn till 10 o'clock—the fall during the preceding night had been singularly small: at the hour just named the water in the tubes of both began to rise rapidly, having ascended two inches by 1 o'clock; here it paused in both for a little, and then descended with great celerity all over the afternoon and night. Any one who has an old mag-case and a piece of glass tube may repeat the experiment for himself; it does not seem to require any considerable degree of care. Probably a cask or tub, or any kind of water-tight vessel of two or three feet in length, with a hollow bamboo inside, and piece of cork as a float, might suit as well as the contrivance already made use of. It would be interesting to know if the same thing occurred with instruments of different forms, soil of different kinds, or in localities widely apart.

THE Anniversary meeting of this Society took place in their rooms, Town Hall, on Thursday the 24th May, at three o'clock P. M.—Present—The Hon'ble J. P. Willoughby, Esq., *Vice-President*, in the Chair; Dr J. Burnes, K. H.; Lieutenant-Colonel G. Moore; Captain R. Ethersey, I. N.; H. Conybeare, Esq.; Professor J. Patton; Captain S. V. W. Hart; Major J. Holland; Dr J. Patch; Dr J. W. Winchester; Commander G. Jenkins, I. N.; Ali Mahomed Khan, Esq.; and Dr G. Buist, Secretary.

The minutes of the meeting held on the 19th April having been read and approved of, the printed voting lists for Office-bearers for the ensuing year were scrutinized, and the following gentlemen found to have been chosen by a majority of votes, viz.—3 *Vice-Presidents*—1, The Hon'ble J. P. Willoughby, Esq.; 2, Commodore J. C. Hawkins, I. N.; 3, Lieutenant-Colonel P. M. Melvill.—12 *Resident Members*—1, C. Morehead, Esq., M. D.; 2, H. Giraud, Esq., M. D.; 3, Captain J. Barr; 4, C. J. Erskine, Esq.; 5, Lieut.-Col. N. Campbell; 6, Captain R. Ethersey, I. N.; 7, Major J. Holland; 8, Commander G. Jenkins, I. N.; 9, S. S. Dickinson, Esq.; 10, Commander C. W. Montriou, I. N.; 11, Professor Joseph Patton; 12, Lieutenant Colonel G. Moore.—8 *Non-Resident Members*—1, Major H. C. Rawlinson; 2, Captain E. P. Del'Hoste; 3, Captain G. Fulljames; 4, Lieutenant C. J. Cruttenden, I. N.; 5, Major G. LeG. Jacob; 6, Captain P. T. French; 7, R. K. Pringle, Esq.; 8, Dr. E. Impey.

The accounts of the Society for the year just ended were laid on the table, and exhibited a balance in their favor in the hands of the Treasurers and Secretary of Rs. 3,212.

Annual Statement of Receipts and Disbursements of the Bombay Geographical Society, from 1st May 1848 to 30th April 1849.

Disbursements.				Rs.	A.	P.
April 30th, 1849.						
To Printing				1125	6	0
„ Establishment				571	8	0
„ Contingent and Miscellaneous expences				162	5	2
„ Maps and Instruments purchased				309	4	8
„ Treasurers' Commission on Receipts to 31st July 1848, Rs. 1149 0-11, at 1 per cent., as per their Statement rendered				11	7	11
				2179	15	9
„ Balance to this date in favour of the Society, as per statement dated 31st July 1848, and continuation up to this date, viz.						
Sums at Credit			3960 14 8			
Deduct.						
„ Sums at Debit			757 12 8			
„ Principal balance at the Credit of the Society with the Treasurers this date			3203 2 0			
„ Balance in the hands of the Secretary			9 4 11			
				3212	6	11
		Rupees...		5392	6	8

Receipts.				Rs.	A.	P.
April 30th, 1848.						
By Balance in the hands of the Treasurers this date, as stated in the Annual Statement prepared for last year	3322	5	8			
„ Ditto in the hands of the Secretary	10	0	1			
				3332	5	9
April 30th, 1849.						
„ Amount of Government Subscription for 12 Months, at Rs. 50 per month				600	0	0
„ Ditto collected during the year by Subscriptions from the Members				1315	0	0
„ Ditto for printing copies of the Society's Transactions sold				21	0	0
„ Interest allowed by the Treasurers, Messrs Remington & Co., on the 31st July 1848, as per their statement rendered				124	0	11
Rupees				5392	6	8

(Signed) GEO. BUIST,
Secretary to the Society.

Bombay, 30th April, 1849.

Examined and found correct.

(Signed) GEO. MOORE.
(Signed) S. V. W. HART.

The following gentlemen were elected Members of the Society:—1, Commodore Lushington, R. N., Commander-in-Chief I. N.—proposed by the Hon'ble J. P. Willoughby, seconded by Captain Ethersey, I. N.—2, J. L. Jenkins, Esq., Barrister—proposed by ditto, seconded by Major Holland.—3, Dr R. Haines—proposed by Dr Winchester, seconded by the Hon'ble D. A. Blane, Esq.—4, Capt. Wills, of the ship *Charles Forbes*—proposed by Commander G. Jenkins, I. N.—seconded by Captain R. Ethersey, I. N.—5, Captain E. Evans, of the ship *Charles Grant*—proposed and seconded by the same gentlemen.

It was suggested that Government should be applied to for copies of such of the Maps of the Great Trigonometrical Survey as had been published. It was proposed that a considerable purchase of the Maps published by the Governments of Continental Europe should be made, those of Austria in particular being remarkable alike for their beauty and cheapness. The subject was referred to the Committee on Physical Research, who were requested to draw up a Report, and submit an estimate to the Society. The list of Instruments in the possession of the Society directed at the March meeting to be prepared, was laid on the table; with several donations of books, papers, &c. The donors of these latter were directed to be thanked for their gifts; and after a vote of thanks to the Chair, the meeting separated.

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

ART. I.—*Remarks on the late Hurricane of April* 1847, *on the Western Coast of India.* By Dr. A. THOM, of H. M. 86th Foot. Accompanied by three Diagrams, shewing the position of the Malabar Hurricane on the 17th and 18th of April last; with a letter from the author.

[Communicated by the Author.]

PREFACE.

THE following paper is offered to the Geographical Society of Bombay, on the presumption that it embraces a subject of local as well as general importance. Even without the realization of one dreadful disaster too much to be apprehended, the known calamities traceable to the effects of the late Hurricane of last April, on the Malabar Coast, are really so appalling and so fraught with the loss of human life, as to affix a melancholy interest to its records. To aid in averting or lessening the evils incidental to the recurrence of such tempests, is a step highly creditable to any body of men, even although it may, in some degree, lead from the legitimate objects of their association.

Societies formed for scientific purposes may nobly lend their assistance in the best interests of humanity, and point the way to those on

whom the duty of giving practical effect to their suggestions must ever devolve. However, the first principles of Governments are supposed to be the preservation of the lives of their subjects, the diminution of human suffering, and conservation of property. If the means of effecting these objects are unknown, the sooner they are sought for the better: if only doubtful, there is still stronger reason for ascertaining the truth. Public money could hardly be appropriated to a more useful purpose. None who read and reason can deny that fully developed hurricanes obey regular laws, although these are not perfectly known and defined—as might be expected in a science as yet in its infancy. It is also well known that while one vessel rushes into all the perils of a vertical gale—perhaps to certain distruction,—another, whether from accident or foresight, may, by lying to, or running in a particular direction, escape without even the loss of a spar. The details of the Malabar Gale contain proofs of this too palpable to be overlooked.

Had a general system of Meteorological observation been established over India and its neighbouring appendages, a complete knowledge of those devastating storms which sweep the Bay of Bengal, and lately ravaged the West Coast and Arabian Sea, would have been obtained, far more satisfactory than anything dependent on the casual and isolate exertions of individuals. A line of littoral posts of observation established at every one or two hundred miles distance, extending from Calcutta round Ceylon or Cape Comorin to Kurrachee in Scinde, and others traversing the Peninsula from east to west, if placed under some system organized by one of the Scientific Societies, would tend to throw important light on the relative force, moisture, and direction, of the two great periodical winds at different parts of the country, on the true nature of their stormy commotions, and the apparent connection of these with their changes. Even medical knowledge might thereby be greatly advanced.

What would this *cost?* is the question of the economist. We think little more than the price of the necessary instruments,—perhaps a sum of £1000 or £1500,—scarcely that which the masts and spars of one ship, the *Buckinghamshire*, cost, to say nothing of the loss of the *Cleopatra, Mermaid,* &c. Among its servants the H. E. I. Company has many officers surpassingly distinguished for intelligence, scientific acquirements, and their almost invariable concomitant—zeal; who, as amateurs, would no doubt willingly volunteer their spare time to the carrying out the objects proposed.

In apologizing for the imperfections which may be found in the following pages, the writer must add that many insurmountable difficulties to the attainment of his object came in the way, chiefly owing to his distance from the sources of information at Bombay and shipping in its harbour, and thus being deprived of the means of having suspected or palpable errors and discrepancies explained or corrected. He has to express his sincere thanks to those—many of whom are perfect strangers to him—who have so warmly seconded his endeavours to collect the requisite information ; especially to Mr. NORMAN OLIVER, of the Master-Attendant's Office at Bombay, and Captain LYNCH, I. N., to whom he is indebted for most of the logs of vessels, as well as to other Officers of the Indian Navy. He has also to acknowledge the interesting communications received from Captain MACGREGOR, of the *Buckinghamshire*, and those forwarded by Doctor ST. JOHN at Madras, and Doctor RAE at Ceylon, Deputy-Inspectors of H. M.'s troops. Surgeon MACGREGOR, of H. M. 25th regiment, also kindly collected the information connected with the storm at Cannanore and its neighbourhood.

POONA, 10*th September*, 1847. A. T.

IN an attempt to gather the more important facts connected with the late disastrous Gale on the Malabar Coast, my expectations have been somewhat disappointed ; however, I still anticipate the acquisition of more complete and satisfactory details than those which have yet come to hand. In the meantime, while the event is yet fresh in our memory, a few remarks on the subject may be acceptable to some of your readers, and perhaps elicit additional information tending to elucidate obscure points, or correct any errors into which I may inadvertently have fallen.

It is not necessary to the subject to comment on the calamitous consequences of the tempest, as, in its progress from Ceylon to Scinde, it travelled along the Western Ghauts of India, uprooting the giants of the forest, deluging the plains, and spreading desolation among the habitations of man ; while, with a fury that was perfectly appalling, it swept the neighbouring ocean and strewed the coasts with the wreck of vessels and human bodies. Apart from the fearful loss of life and amount of suffering, the immense destruction of property occasioned by the gale would be a sufficient reason for seeking to forward our knowledge of these terrible phenomena, and from thence to deduce some rational means of averting the evils incidental to their recur-

rence. It is true that the Arabian sea is rarely subject to such visitations, but this ought to be an incentive not to let so favourable an opportunity slip without collecting all that is known on the subject. Since the storm of 20th April, 1780, noticed by HORSBURGH, perhaps none has ever devastated the Western Coast of India with such severity at that of last April—also about the 20th of the month.

It is much to be regretted that while the tempestuous movements of our atmosphere create a keen interest in the inquiring mind, and are of profound importance to mankind, yet it so happens that the means of discovering their real nature are unattractive, dry, and laborious: at least it would appear so from the neglect with which the whole subject has hitherto been treated, in spite of the exertions of Mr. REDFIELD, Colonel REID, Mr. PIDDINGTON of Calcutta, and a few others. Perhaps one great reason of this arises from the difficulty which the student in this branch of sciençe encounters from the absolute necessity of being dependant on others for details, which too often turn out to be loose, erroneous, or contradictory, and generally the result of casual or misdirected observation. The astronomer can seize within the grasp of his observation the remote object of his study, and alone, night by night, trace its path along the heavens, measure its orbit, and compute its distance. In the laboratory, the chemist is enabled, unaided, to analyze the most crude piece of matter, and render up its simple components in all their purity. Even the geologist, independent of others, may pursue his investigations in the primeval forces of earth: to him the sleeping volcano, river, mountain, and chancelled plain, respectively tell their tale in silence.

Widely different is the case in regard to the study of storms; for here it becomes necessary to accumulate the cotemporary information of many observers who have accidentally been scattered over a vast expanse of land or sea, and who were often careless, ignorant, or unacquainted with what they ought to notice. Hence trivial points are often carefully recorded, while the more important, and even more common, phenomena are unheeded. The consequence is, that, although the Theory of Hurricanes is now pretty well established, it is far from possessing that exactitude which belongs to many other branches of knowledge, and which can only be attained by an extensive system of observation, carried out by competent persons and good instruments. This, however, can only be achieved by the interference of one or more Governments.

To render the following observations more intelligible to general readers, it may be well to convey some idea of what is meant by a Rotatory Gale. It has been ascertained that during great storms or typhoons, within, or near to, the tropics, the wind blows in a circuit round a moving focus; and that the force increases, from light winds or a moderate breeze at the periphery, till near the middle it acquires all the violence and character of the hurricane. Perhaps one of the most extraordinary features in the whole history of storms is the fact of the very centre being occupied by a calm space of ten to twenty miles in diameter, around which the wind revolves with overwhelming impetus. It is also found that the barometer indicates diminished atmospheric pressure, beginning at the exterior of the stormy circle and increasing towards the focus, where the amount of depression of the mercurial column has frequently exceeded two inches. The diameter of the area over which the wind rotates in conformity with the circle, is often 600 or 700 miles, but it is only within 100 or 150 miles of the centre that the force is equivalent to a typhoon or hurricane. The direction of the rotation is always the same in the same hemispheres; that is, in the northern, S.E.N.W., or with the hands of a watch; and in the southern, N.E.S.W., or in the contrary way. While a vast disc of atmosphere is thus revolving on its centre, and in reality forming a gigantic whirlwind, the whole moves onward along a certain line of progression, from which it seldom diverges beyond a few points, and which runs in a westerly direction from the equator towards the poles, being N.W. in the northern, and S.W. in the southern, hemispheres. Thus a person looking westward, on the equator, at Sumatra, would find the storms on his right curving towards India or the Bay of Bengal, and on his left rushing S.W. or in the direction of Mauritius. It is impossible to notice, even in a brief manner, all the important features of gyratory storms, such as the incessant rain, electrical discharges, and confused sea, raised by the "contending winds."

From a careful examination of all the particulars connected with the late Gale on the Malabar coast, I am fully satisfied that it was a revolving and progressive typhoon, obeying the laws which have just been alluded to as governing such phenomena in the northern hemisphere, with this peculiarity, that its path, instead of being N. Westerly, like those traced by Mr. PIDDINGTON in the southern part of the Arabian Sea, was much more northerly, and nearly following the line of coast from Cape Comorin to Kurrachee. The central track

appears to have been about 50 or 60 miles from the land, with one segment of the circle embracing the Ghauts, and the other the Laccadive Islands. In the following paragraphs it will be our object to furnish a brief abstract of the facts from which these conclusions have been drawn. To give all the details in their undigested form is out of the question on the present occasion, but those who take a more than ordinary interest in the subject may rest assured that they shall be laid before the public in another place.

From the 5th to the 10th of April severe thunder-storms and unsettled weather prevailed at Ceylon. However, the first indications of stormy movements in the atmosphere, in the form of a gyrating mass, were observed about the 12th April in the neighbourhood of Ceylon, where it was blowing a heavy gale from East, both at Colombo and Trincomalie. The ketch *Ceylon Island* when within 26 miles of Colombo had the "wind S. S. E. to E. S. E., *very violent*, the sea high, and much rain fell," which obliged her to stand off to the westward. On the same day the *Buckinghamshire*, in Latitude 5° 41′ N., Longitude 68° 38′ E., had "a steady breeze at N. N. W." On the equator, it is known that westerly winds prevail at that season.

On the 13th April, the *Ceylon Island* appears to have had more moderate weather after she ran N. W.; but the *Buckinghamshire*, as she steered to the N. E., and at noon was in Latitude 7° 11′ N., Longitude 70° 49′ E., found the wind still at N. N. W., but increasing to "fresh breezes, and cloudy weather with lightning all round." The latter vessel would appear to have been entering the western side of the stormy circle. We also learn that "at the Neilgherries the rain and the wind commenced there with great violence on the 13th," and elsewhere we find that it was easterly. From Trichinopoly, Madura, and other places, similar accounts were received.

On the 14th, the circular direction of the storm is traceable over an immense tract of land and sea. At Trincomalie the gale blew from *South* to *East*; near Colombo, it was *East* by *South* to S. S. E. At Aleppee also the gale was beginning at S. E. to East. Over the southern part of India *Easterly* winds were prevailing. About 400 miles to the westward, in Latitude 8° 18′ N., Longitude 72° 56′ E., the *Buckinghamshire* had "squally weather, *constant rain*, and much lightning," along with a *northerly* breeze. The usual westerly winds near the equator appear to have been blowing and extending northward

after the focus of the storm. In 5° S., Longitude 57° 57′ E., the *Zemindar* had S. W. winds, with "a heavy swell from S. E." Between the position of the *Buckinghamshire* on one side and Ceylon on the other, we may infer the existence of the centre of the gale, although we have no information of any vessel having been in that tract of ocean excepting those whose fate has been surmised as indicative of very bad weather.

On the 15th, it is said to have been "very windy" at Colombo. The direction is not ascertained, but there could be little doubt that it was about S. E. to S. S. E., as we find from good observations that at Colombo on this day a heavy gale, with lightning, thunder and rain, was blowing from *E. by S.* with a force of 6·2 pounds (a "great storm"); and off Cape Comorin the *Ceylon Island* had it "blowing tremendously at *S. E.*, and the vessel, under bare poles, running before it." On the Neilgherries, at the Dodabetta Observatory, it appears that *hourly* observations only gave a variation from *E. by N.* to *E.* ½ *S.* in the 24 hours, but the gale had a pressure of 10 pounds on the square foot. In the open sea to the westward of Cape Comorin, the *Buckinghamshire* at noon, in Lat. 9° S., Long. 73° 4′ E., had "fresh N. N. E. gales, severe squalls, a heavy sea, accompanied by incessant heavy rain, thunder and lightning," and in the course of the preceding night "split her foretopsail, foresail, and mainsail." Along the Malabar coast the gale was commencing at Cochin and Calicut, and the *Faize Rubahny* "in getting to the southward," after light airs or calms and hazy weather, "caught a breeze at S. E. about noon when in Lat. 12° 18′ S.," and her log-book records a "*confused* sea" to have been experienced—the usual harbinger of a rotatory storm before the wind even had set in.

Thus, as far as the facts in our possession extend, they shew a severe gale blowing from south, by east, round to north, and it is only from want of information that the fourth side is not determined; and, regarding this, we have not a single bit of evidence tending to invalidate the natural inference of a complete circle having been established; while argument, deduced from the known law of the prevalence of the true westerly monsoon at the season in question, would confirm our opinions.

On the 16th.—The revolving character of the storm as it travelled along the coast, is still more clearly developed on this day, as we have satisfactory observations from every quadrant of the tempest's circle.

At Colombo, it was reported to have been "stormy, rainy, and cloudy," and at Trincomalie it blew a gale which veered from south to *S. W.* with a force of 4 pounds on the square foot, the sky "overcast, with lightning, thunder, and rain."

About 30 or 40 miles from Cape Comorin, the *Ceylon Island* had tempestuous weather, with the wind blowing at *S. E.* to S. S. E., and in the course of the day "lost the mizen topmast, crossjack yard, and had all the sails blown away." This little vessel, both on this and the previous day, had been "scudding right before it under bare poles": we must therefore conclude that the sails were carried out of the gosgets,—an accident that can only happen to well stowed sails by a severe hurricane. At Cannanore and Tellicherry the gale was setting in at E. S. E. and *S. E.*, "with one continuous shower of rain, vivid sheets of lightning, and dreadful claps of thunder"; while the *Faize Rubahny*, in Lat. 11° 19′ S., near the coast, had a moderate gale at E. S. E., with a very high sea, hazy weather, and some rain. She was under single-reefed topsails, and, in steering southward, met such a heavy head sea as to cause her "to pitch away the flying jibboom and spring the mainmast."

On the western border of the storm we find the H. C. Steamer *Sesostris* running to the eastward and finding the wind at N. N. E. gradually increasing to a gale, and "a long swell from the S. E." was experienced when in Lat. 13° 15′, Long. 70° 28′ S. It is also noticed in the log-book, that there was "a very dark threatening appearance to the eastward."

About 200 miles south-east of the *Sesostris* we find the *Buckinghamshire* to have been in about Lat. 9° S., Long. 72° 58′ E., with a hard gale at north by east, and *north*, attended "by a very high sea and constant rain." The vessel (a 1400 ton ship) was under double-reefed topsails, with the foresail furled and the royal yards on deck,—all indicative of bad and threatening weather.

On the Neilgherries, at the Dodabetta Observatory, the gale was E. S. E. with an increasing force, which at noon, on this day, was 18 pounds on the square foot. The wind had gradually veered from E. ½ S. to E. S. E., the sky overcast, and incessant rain descending.

At Madras, the wind was *southerly* and light, with cumulous clouds and some rain. At Calcutta, it was *east*, veering to south, "cloudy and thundering." At Bangalore, *S. E.*

PLATE 1

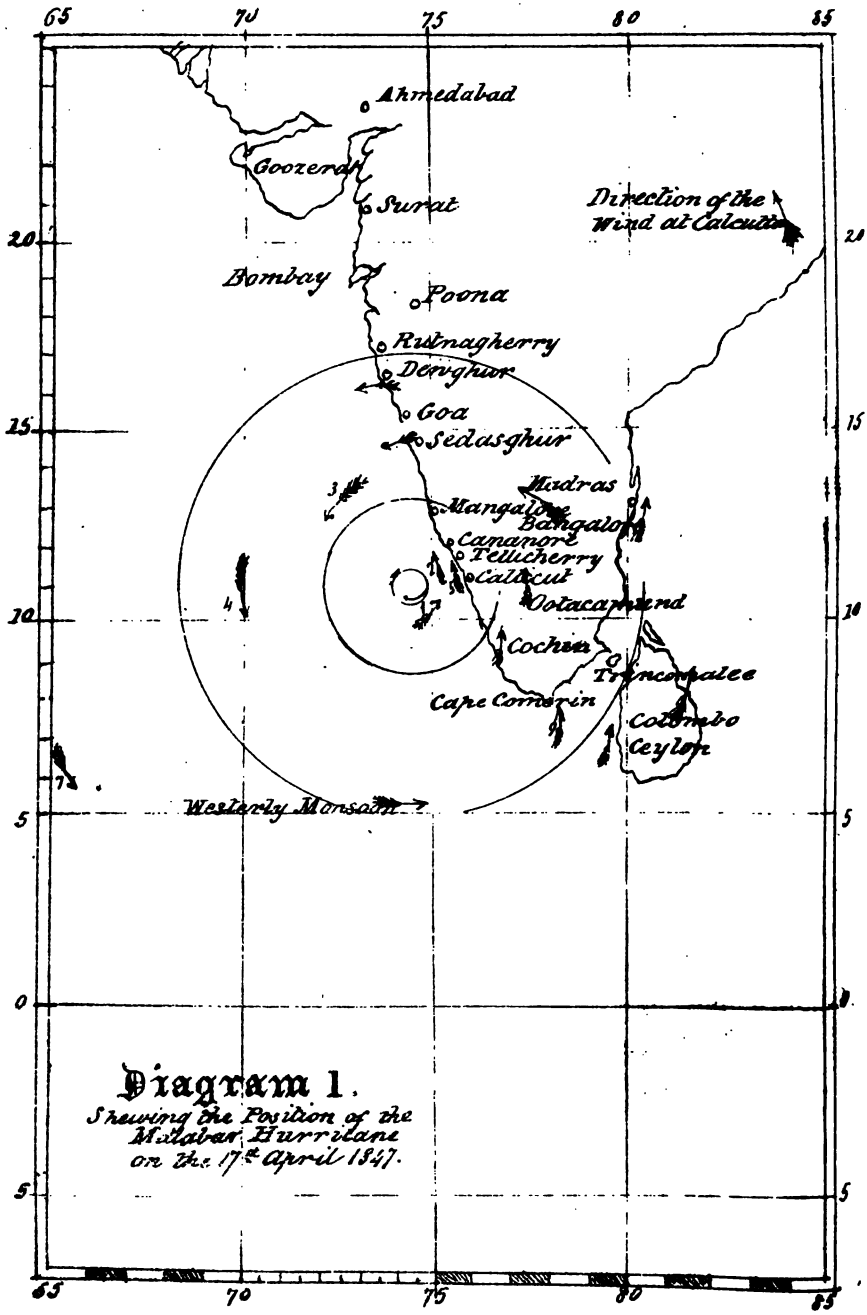


Diagram 1.

Shewing the Position of the Malabar Hurricane on the 17th April 1847.

On the 17th.—Whatever doubts may be entertained regarding the rotatory nature of the gale up to this day of its duration, it will be difficult for any one who fairly examines the subject to withhold his assent to such an opinion on this and the subsequent two days. At least the following notes in connexion with diagram No. 1, appear to me to be quite conclusive as to the circular direction of the gale, and by being so, it affords a presumptive proof that since its formation about the 11th or 12th this had been its true character, although chance has yet denied us the means of fully demonstrating it. In the diagram (No. 1) which is intended to illustrate the position of the focus of the hurricane at noon on this day, the arrows are traced to shew the direction of the wind at certain points where it was ascertained by observers on land or sea, and are curved in the direction of the wind's veering.

The *Buckinghamshire* was in Lat. 10° 20′ N., Long. 75° 5′ E., and had the storm blowing at *S. S. W.* about noon, and her place on the diagram is denoted by No. 1 arrow. In the course of the previous twenty-four hours she had been steering N. E. by E. and got two hundred miles nearer to the coast than on the previous day. In the mean time, the focus of the hurricane passed across her path to the northward, so that she was nearly in its wake. The weather which she encountered was bad—"heavy gales, violent squalls, constant rain, and lightning to the northward." A heavy head sea (N.E.) was met with, and the wind veered from *North* by *N. W.* to *W.S.W.* and *S.S.W.*

The *Faize Rubahny* had no observation of the sun, but her log would place her about Lat. 11° 30′ N., Long. 75° 10′ E., near arrow No. 2 on the diagram. The wind had been rapidly increasing in violence, but only veered from *E.S.E.* to *S.E.*, owing to the little change in her position for 24 hours, and the centre of the storm coming almost directly along the coast towards her. She had "a "very heavy gale, with a tremendous sea, which washed away the "lee-quarter boat and strained the ship fore and aft. At 8.30 A.M. "shipping heavy seas, which laid the vessel's leading blocks under "water. Ship occasionally motionless in the water. Cut away the "mainsail and maintopsail from the yards, being unable to take "them in." The ship was burying herself in the awful sea that was running; she was making two and a half feet water per hour, and the pumps constantly going to keep her afloat.

In shore of the two vessels alluded to, we find that the Steamer *Victoria*, while at anchor off Cannanore, experienced frightful weather and the hurricane from E.S.E. "In this situation the surf was "making a clean breach over her, taking with it the whole of the "bulwarks from the starboard side, filling the gig, bending the "davits, &c." Finding "the rollers to be coming in with more force, "she slipt from her anchor and stood out to sea, rolling and pitching awfully" as she passed through the surf, and hove to outside. Still "the sea was tremendous, the ship labouring heavily," and a violent gale blowing. But there is not space for a detail of the injuries which the vessel sustained on this day.

Near her, in Lat. 11° 38′ N., and within 10 or 12 miles of the coast, the *Mermaid* had the same gale, at E.S.E., and about noon "carried away the flying jibboom, fore and main-topmasts and "mizen topgallant-mast," while under close-reefed topsails.

While the ships on the coast had the tempest from *South* and *East*, those to the westward had it *North* and *West*. Thus, the *Sesostris*, (No. 3) in Lat. 13° 28′, Long. 72° 7′, had "fresh gales at "*N.N.E.*, a heavy sea and hard squalls, with much rain and continued vivid lightning. The vessel rolling heavily." At the same time the *Swithamley*, in Lat. 11° 30′, Long. 70° 15′ E., (fig. 4) had a moderate gale at *N.W.* to *W.N.W.*, with a heavy swell from *N.E.* It was squally, and much lightning and thunder were experienced, while heavy masses of gloomy clouds covered the eastern half of the sky. The vessel was under double-reefed topsails.

Off Cape Comorin, the *Ceylon Island* had a *S.W.* gale, and was scudding under bare poles. Her place on the diagram is No. 6.

At a distance from the centre of the hurricane, the winds, as far as we can collect from detached information, were perfectly conformable to the vast whirlwind which they embraced. Leaving Aden, the H. C. Steamer *Auckland* had *N.E.* winds; in Lat. 70° S., Long. 57° 12′ E., the *Zemindar* had a *N.N.W.* breeze; at Ceylon, and Madras, South and S.W. winds; at Bangalore, they were S.E.; and at Bombay, light unsettled breezes at S.E. to N.E.

Nearer to the focus of this great circuit, we have the most complete information relative to the hurricane from the Observatory at Dodabetta, where, by a series of hourly observations, it appears that the

PLATE 2

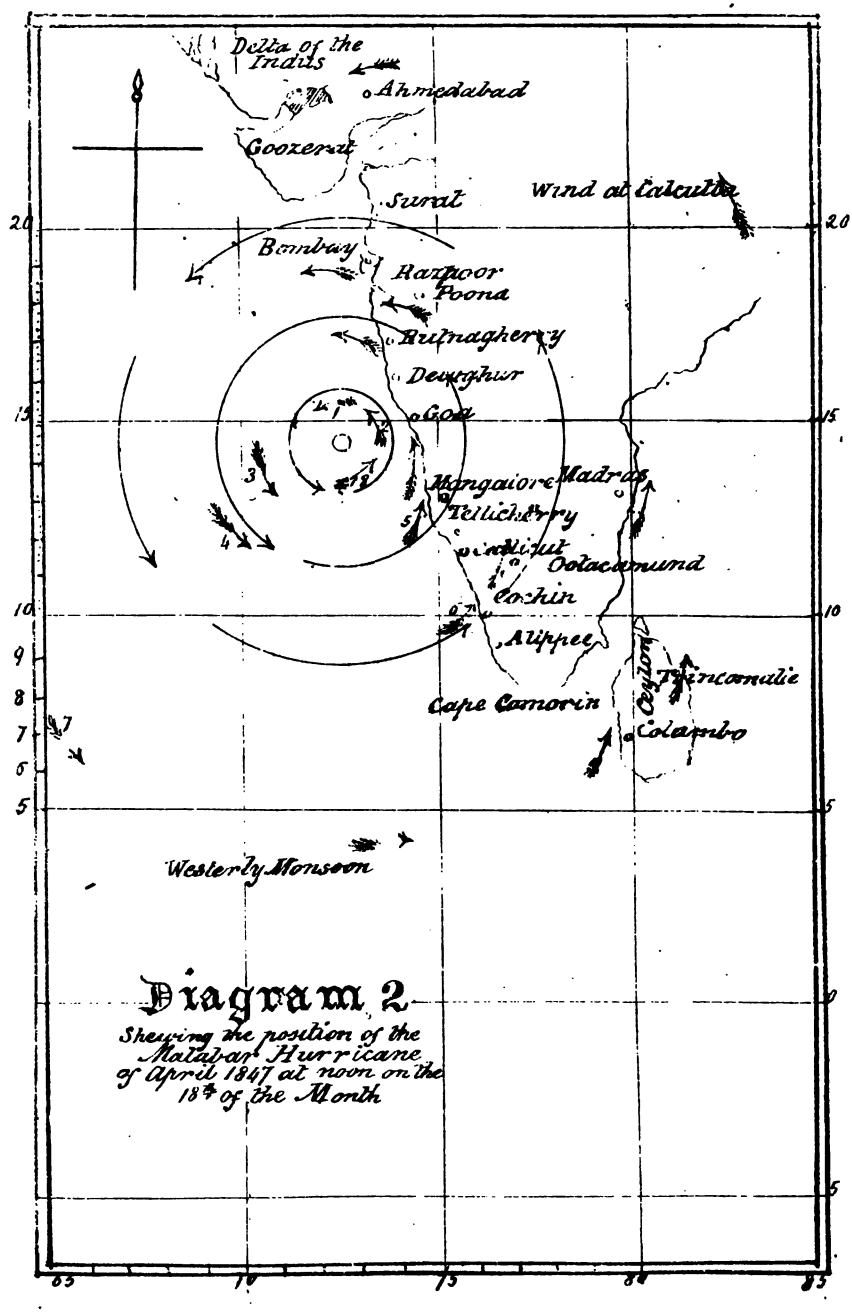


Diagram 2

Shewing the position of the Malabar Hurricane of April 1847 at noon on the 18th of the Month

wind veered from E.S.E. to South or S.W., but was somewhat unsteady at the latter point; but when at S.E. its force was equal to a pressure of thirty pounds on the square foot! for the space of three hours.

From numerous places along the Malabar coast, we have a heap of information before us, all strongly corroborating the facts adduced in favour of a rotatory direction in the gale; and its devastating effects on the Coast and Laccadive Islands have already been laid before the public in many interesting notices in the *Bombay Telegraph and Courier*.

While the storm raged with such fury on the southern part of the coast, at Poona the weather was hot, sultry, and threatening. It was only on the evening of this day, or a few hours after noon, at the period to which the preceding remarks are referrible in order to render them simultaneous, that a fresh *easterly* wind set in at this place, and heavy massy cumulous clouds were hanging on the southern horizon, pouring out electricity so unceasingly as to keep up a steady and lurid illumination of the mountains in that direction. A few showers occurred, and ·57 inches of rain fell.

On the 18*th*.—For the purpose of shewing the path and progression of the tempest on two consecutive days, a second diagram (No. 2) has been projected, in which the course of the wind at different points is laid down in accordance with the information in our possession. It will be seen at a glance, that after a lapse of 24 hours, during which the stormy mass of atmosphere had moved along the coast from Lat. 11° S. to Lat. 14° 30′, the revolving direction is perfectly evident. Circumstances not under my control prevent me from giving a more complete series of these diagrams, as they are always much more useful in conveying a correct notion of the gale than pages of letter press.

We now discover that S.W. winds were blowing off Cape Comorin, where a few days before they had been at N.E., or the opposite quarter.

The H. C. Steamer *Sesostris* (No. 3) was well to the westward of the more violent part of the typhoon, but still she had bad weather, in Lat. 13° 55′, Long. 71° 13′, with the wind *North*, and "a heavy "sea rising in pyramidal masses."

The *Swithamley* (No. 4) was in Lat. 12° 22′ N., Long. 70° 15′ E., under double-reefed topsails, with a gale at *N.W.* to *W.N.W.*

The *Mermaid* (No. 8) was in Lat. 13° 52′ N., and about Longitude 74° E., with the hurricane decreasing at *W.S.W.* In the course of the previous twenty-four hours, this unfortunate vessel, after having lost her topmasts, was obliged to cut away her mizen mast; and with five feet water in the hold, and the pumps constantly going, she was compelled to run N.W. before the "increasing gale (at South) ac-"companied by heavy rain, thunder and lightning," and a tremendous sea running, and causing the ship to labour and roll heavily. During the twenty-four hours the wind veered from S.E. by South to W.S.W., and the Barometer was down to 29.40.

In shore, the *Victoria* (No. 5) was lying to, drifting with a "*Southerly*" storm along the coast from Cannanore towards Mangalore. She had the Barometer at 27.70, and "strong gales with "heavy rain, severe squalls, and an increasing swell, caused the vessel "to labour greatly."

The *Faize Rubahny*, (No. 2) at noon, was in Lat. 15° S., and Long. 73° 28′ E., with the storm at S.E. to *South*. Since the 17th, she had been scudding before it to the Northward till 6 A. M., when she was hove to. Her log-book conveys a fearful picture of the state of the weather, and of the injuries done to the vessel by "the violent "squalls and tremendous sea," while the water was entering her sides at the rate of thirty inches per hour. The topsails were blown out of the halt-ropes, the quarter boat washed away, and the long boat carried out of the chocks.

In the course of the twenty-four hours ending at noon on this day, the *Buckinghamshire* (No. 1) had been scudding N.N.W., between the focus of the storm and the land, and was running in a direction nearly parallel to that of the storm's, but the line of coast obliging her to keep a good offing, her course was necessarily changed to N.W., which gradually brought her nearer to the greatest danger; and as her speed appears to have been greater than that of the progressive movement of the focus, she arrived nearly in front of it, at noon, when, in about Lat. 15° 10′, Long. 73° E., she had the hurricane from *S.E.*, and "with the gale blowing furiously, and veering to the east," the fore and maintopsails, and foresail, were blown away.

As the very focus of the gale passed over this fine vessel within a few hours after noon of this day, we think it better to give a few extracts from the log-book, as likely to convey a truthful idea of the nature and force of the centre of a disc of atmosphere in violent gyration. This, properly speaking, ought to have been recorded under the head of next day, as we have adopted nautical and astronomical time for the purpose of illustrating the diurnal progression of the gale, but we think it will be more *effective* here :—

"At thirty minutes P. M. the ship broached to. The mizenmast "was cut away, and the vessel kept before the gale. At forty-five "minutes P. M., the wind increasing to a perfect hurricane. "At one P. M. the foremast fell over to starboard. A most "furious gust blew away the mainmast near the deck, and tore away "the quarter boats, the *starboard or large cutter flying across the* "*poop.* The violence of the wind was indescribable; everything "exposed to its fury being blown away. The poop ports having been "forced in by the strength of the wind, the *bulkhead of the cuddy* "*was also blown down,* destroying the Barometers and everything in "the cabin. The ship labouring excessively, and everything on deck "adrift or destroyed, &c. The crew unable to stand on their legs "or to hear one another speak, and exposed to great danger, from "the stunning force of the wind. The fore and mainmasts got under "the ship's bottom, and the mizenmast endangering the rudder; all "violently tearing off the copper.

"At 2 P. M. *it suddenly fell calm,* but the sympiesometer indicated "no favourable change, *continuing as low as* 28·08. During the calm, "got the wreck of the masts cut clear of the vessel. *The ship* "*covered with aquatic birds,* of which thousands were dying on the "deck. About 4 P. M. the wind that had ceased at *E.S.E.* or *East,* "began to blow with equal fury at *West North West.* The ship "was again quickly enveloped in the sea, and laboured with a violence "that nothing could resist. At 9 P M. wind abating, and the sym- "piesometer at 28·96. Three and a half feet water in the hold. At "midnight the gale moderating at West, and the sympiesometer "at 29."

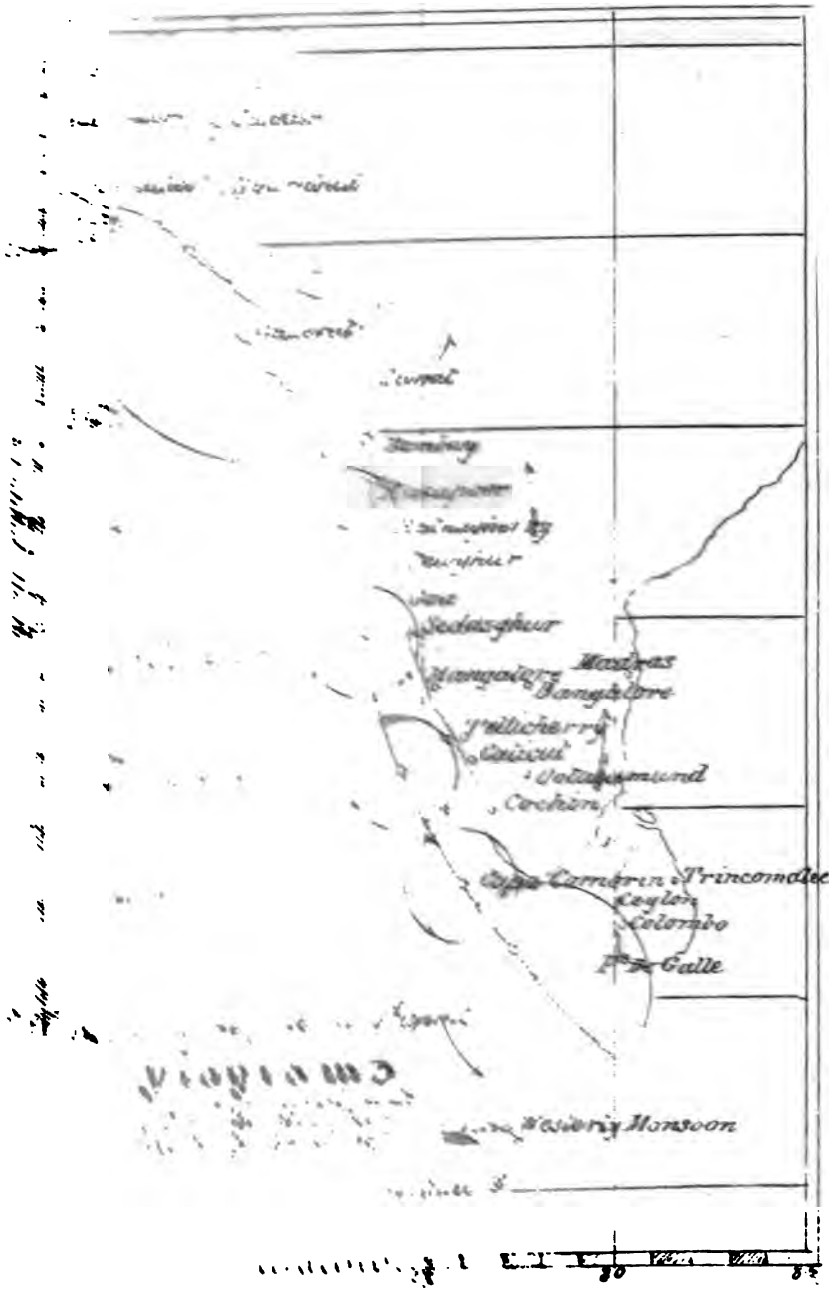
The terrible effects of the vortex of a hurricane on a 1,400 ton ship are thus vividly pourtrayed in the simple but effective words of an eye-witness. The increasing intensity of the wind, suddenly termi-

nating in a calm of two hours, and again rapidly bursting over the vessel with all it pristine wrath, from the very *opposite* point of the compass, are all so characteristic of revolving gales, and so uniformly met with at their centres, in the Atlantic, Indian, and Pacific oceans, as to constitute one of the most remarkable laws which belong to their phenomena. It has been truly said, that there is something in this strange stillness of the atmosphere far [more appalling to the seaman than the overwhelming force of the typhoon that surrounds it. The wind ceases; a noble vessel, shorn of her masts and left a mere wreck, is tossing on the broken waves, or half buried under the pyramidal masses of sea raised in mountainous heaps, not a breath of wind to steady the reeling hulk; while the barometer stands fearfully low and tells of another and coming conflict with the tempest. Off Mauritius, the *Exmouth*, when in one of those calms at the middle of a hurricane, after being enveloped in dark low masses of cloud for several days, found the sun break out for a few minutes, but the mercury in the tube of the barometer sunk below the open part of the wooden frame, and till its subsequent rise the Captain suspected that the glass was broken; yet in half an hour more the wind was again blowing with terrific force from the *opposite quarter*.

To return, however, to our subject, and examine the state of the winds and weather at a distance from the centre in which the *Buckinghamshire* was sustaining so much damage, we shall find everything tending to show a vast circle of atmosphere in rotation. In Lat. 8° N., Long. 60′ E., the *Zemindar* had west winds. At Ceylon they were S.E. to S.W.; at Madras, S.W.; Bangalore, S.E.; Calcutta, South to S.E.; at Deesa, N.E. to S.E.

Nearer to the focus, the *Ceylon Island*, (No. 6) in Lat. 9° 14′ N., on the coast had S.W. winds, getting less severe as she dropped behind the gale. At Dodabetta, near Ootacamund, the gale was still blowing with a force of ten pounds on the square foot, and veering from *S. by W.* to *S.W.* At Cannanore and Sedasghur, the gale "had got round to the monsoon quarter." On this day the storm was moderating on the Neilgherries at *S.W.*, and commencing at Belgaum and Rutnagherry at *N.E.* At Mahabuleshwar, "the sky "assumed a threatening appearance, the sun became completely ob- "scured, and towards evening a storm set in, the like of which had

PLATE 3


Madras
Bangalore
Pallicherry
Cuddalore
Cochin
Trincomalee
Ceylon
Colombo
Galle
Western Monsoon
80
85

"not been seen at this season of the year by the oldest inhabitant of "the Hills."

At Poona, the first signs of an approaching gale were remarked. The forenoon was calm, but a low stratified haze was spread over the sky, and, as the wind gradually set in from *East* to *E.S.E.*, it deepened into a heavy dark canopy of clouds. The refracted rays of the setting sun, as they struggled through the opening among the heavy masses of suspended vapours, threw a wild, lurid, and almost portentous, glare over the sky and country, such as I have always seen to precede a hurricane at Mauritius.

At Bombay, the gale was setting in and veering from S.E. to N.E., with a force of two or three pounds.

On the 19th, the vortex having passed over the *Buckinghamshire*, on the afternoon of the 18th had advanced as far as Rutnagherry, where it appears to have developed its unabated force. At that place it is said to have been a "most dreadful hurricane," the wind blowing at E.N.E. to N.N.W., "during which time the wind was fear-"fully violent, bearing everything before it,—several houses, trees, &c., "being blown to atoms." "After the winds had blown most furious-"ly from the abovementioned points for four hours continuously, it "commenced blowing from S.W., when the clouds were brought up "in fearful succession from the sea. The rain poured down in "torrents. The hurricane assumed the very acmé of its violence "between the hours of 9 and 11 o'clock on Monday (19th)."

At Saigur and Razpoor rivers, the wind was East and E.S.E. At Severndroog, a strong N.E. breeze prevailed, and during the day increased to a gale. At Bombay, it was blowing between E. by N. and N.E., with a force of four or five pounds;—the sky overcast, and it was raining steadily.

At Poona, the weather had all the appearance of a passing hurricane, such, at least, as usually occurs in countries subject to them. The force of the wind at East and S.E. would only have reduced a vessel to close-reefed topsails; but the dark gloomy sky, fierce gusts, and incessant rain, borne horizontally along, and dense stratum of clouds resting on the earth, were all indications of the true nature of the gale. I stated to several persons, that if ever a typhoon visited the Dekkan the weather shewed the passage of one near us. At Belgaum, and

Mahabuleshwar, the storm appears to have been *nearly* from the same direction as at Poona.

At every point around the vortex, from whence information has been procured, we find the winds conforming to the progressive circle. The *Scrithamley*, in Latitude 14° 39′ N., Longitude 71° 52′ E., had them blowing at *N.W.* to *West*, and *a heavy N.E. sea.*

The *Sesostris*, in Latitude 13° 23′ N., Longitude 73° 14′ E., had West and S.S.W. winds, with a *heavy confused swell from N.W.*, passing squalls, and the vessel rolling heavily. The *Buckinghamshire, Faize Rubahy, Mermaid*, and other vessels on the coast to the southward or in the wake of the vortex, all agree in recording N.W., West, and S.W., winds as far as Ceylon, and in Lat. 7° 50′ N., and Long. 58° E.—I have failed in obtaining any information regarding the winds and weather in Guzerat and Scinde, except at Deesa, where they were N.E. to S.E., and moderate. At Bombay, the storm was East, N.E., and N.N.E.—of a force of five pounds.

From this date we have no means whatever of tracing the central tract of the storm with any degree of certainty. That it passed near Bombay to the eastward or westward, is all that we know. One account (in the *Bombay Times*) says that it came "first from South-east, a most "unusual quarter, and then settling down to South-west, as during the "best established periods of the monsoon." This would lead us to infer that its vortex passed to the westward of the harbour; and almost all other accounts, as far as they go, tend to confirm this opinion. On the other hand, the observations made every two hours at the Colaba Observatory, describe the wind as having veered from N.E. by N. to N.W. and W.N.W. By this, and we must place reliance on it, it is evident that the central part of the storm was to the eastward of the Observatory. But as the force of the wind does not seem to have been at all equal to that previously experienced near the focus, it is probable that the latter passed at a considerable distance from Bombay. Were it not for the indication of a severe storm having successively passed over Surat, Ahmedabad, Deesa, Kurrachee, and Shikarpoor, within a few days after, we lose all direct traces of the Malabar Hurricane, and we might conclude that it had either lost its extreme violence, steady line of progression, and specific rotation, soon after approximating to the coast at Rutnagherry, or altogether broke up.

On the 20th, as we have seen, the winds veered from N.E. to N.W. and W.N.W., at Bombay; on the coast, to the Southward of this, westerly gales, and heavy rain, with overcast sky, prevailed. At Deesa, N.E. to S.E. winds appear to have been blowing.

On the 21st, West and S.W. winds blew at Bombay, and some officers travelling from Deesa to Ahmedabad had a severe thunderstorm, with continued rain and high wind. The *Auckland*, bringing the mails from Aden, had strong south-westerly winds and a heavy S.W. swell from the 22nd to the 26th, when she was in Latitude 17° N., Longitude 66° E.

On the 22nd, 23rd, and 24th, it blew a severe gale at Kurrachee, with lightning, thunder, and heavy "rain." The roofs were blown off some of the new pendalls, &c.

At Shikarpoor on the 22nd and 23rd it blew a severe dust storm, (N.E. ?) on the former day, and on the latter it was accompanied by torrents of rain, and electrical phenomena. "The blackness of the "storm was fearful, the howling of the wilderness dreadful." Houses not only "leaked but staggered and fell down." On the 25th, the tempest had passed, and we lose all further vestiges of its destructive sweep from Point de Galle to Beloochistan.

Although no reliance can be placed on the accounts received from the country boats, in reference to the veering and direction of the gale at certain periods of the day, yet all agree that the gale commenced at *East* and ended at *West*. Several of the Pattamars were blown off the land for "three days," and it took as many more to regain the coast. That the storm travelled from Ceylon along the Malabar Coast and passed Bombay, is equally conclusive. Its tract has been laid down on diagram No. 3, on which the probable position of its centre on each day is marked by a small circle; and the succession of these point out the distances and direction of its diurnal progression till near Bombay; from whence to Shikarpoor, its path being hypothetical, it has been traced by an interrupted line. Hereafter, we may obtain information to clear up this doubtful subject. Had there been as many vessels between Bombay and Kurrachee as in the opposite direction, we should have had something to guide us: at present there are nothing but vague newspaper reports, received from outstations.

I must defer the comments which naturally present themselves to our mind regarding the Barometrical condition of the air, deposition of vapour, electrical phenomena, velocity of the wind, state of the sea, and other equally interesting points in the Theory of Storms, and which have far more attraction in an abstract point of view than the dry repetition of facts which has just been concluded. So far we have altogether adhered to a relation of the circumstances which tend to exhibit the revolving nature of the gale, its extent, line of progression, and daily rate of travelling along the coast, as bearing on the practical object of all such inquiries,—that of enabling vessels to shun similar danger in future.

POONA, 3*rd August*, 1847. ALEXANDER THOM.

Additional Comments on the late Malabar Hurricane of April, 1847.

IN the preceding stages of this investigation, our view has been wholly directed towards the practical advantage likely to accrue from a knowledge of the Rotatory Gales that occasionally visit the Western Coast of India. If great precision has not been attained regarding the late Malabar Hurricane, we think it has, nevertheless, been shewn to have unfolded itself in all the terrible majesty, and with the integrity and permanency of action, which belong to similar phenomena in other regions of the globe. The extent of the circle, the direction of its rotation, path, and rate of progression, are the points of most vital importance in navigation; and, generally speaking, the sea and sky will not fail to give forth unerring indications of the proximity of a tempest in ample time to enable the vigilant mariner to shun the passing or approaching danger: or, if hampered in a narrow channel, to use early precautions to meet it.

In a purely scientific point of view, there is very little to add, on the present occasion, that can be considered as exact; for the various extracts, notes, and scraps of information, before us, rather point at general principles by their concordance in the aggregate than by any separate importance which they possess. To the lovers of abstract knowledge, we are inclined to offer a few observations on the relation between the various phenomena usually developed during a circular storm and their probable connexion with the primary causes,—more, however, for the purpose of exciting an interest in the subject in the minds of those who may hereafter have opportunities of forwarding

the science of storms by their observations, than from any idea of being able to advance it by our present limited sources of information.

If, as there is daily more reason to believe is the case, the intestine action of a disc of atmosphere resting on the earth, and in violent gyration, is always obedient to the same laws, manifests the same signs, and is always followed by similar effects, it is not illogical to say that if a part is found to be perfect, the existence of the whole may be inferred with as much certainty as in the case of organized forms of matter. Hence, with a previous knowledge of the theory of storms within the tropics, the evidence derived from any one of the coasting pattamars, as given in the appendix to this paper, would alone have been deemed conclusive with regard to the late gale having been rotatory and progressive. The providential escape of so many of these clumsy and ill-managed country craft, is perfectly wonderful. It would appear that this depended on the fact of the approaching storm, beginning at East, driving these helpless vessels from the land and carrying them to the westward for "three days," and in as many more again throwing them on the coast.

At a fixed point on land, a series of correct and hourly observations, such as those made at the Observatory of Dodabetta [a copy of which is appended to this paper,] cannot fail to detect the true nature of a passing hurricane. Even at the distance of the Neilgherries from the path and centre of the storm, we find the wind gradually veering in conformity with the bearing of the centre, with a concomitant increase of its force, and descent of the mercurial column, till the focus arrived at the nearest distance, after which both resume their original state in a like space of time. It is obvious that the eastern segment of the hurricane passed over Dodabetta.

Path of the Storm.—The *central path* of the Hurricane seems to have been nearly N.N.W., or parallel to the western coast of India, till it reached the neighbourhood of Bombay, when it would appear to have turned to a due north course, crossing Guzerat and Scinde. Much obscurity rests on the latter part of its career, from an almost total absence of accurate observations on the force and veering of the gale. It appears either to have been greatly modified in violence when sweeping over Bombay, or its centre must have passed at a considerable distance east or west of it. The latter surmise is the most natural, as we have satisfactory proofs of its unabated fury at different

points of its course as far as Shikarpoor and Sukkur. The tract of ocean near the South-west end of Ceylon would seem to be the place where the stormy commotion first acquired a defined form; from whence it travelled Northward along the middle of the channel formed by the Maldive and Laccadive Islands on one side, and the coast of Ceylon and India on the other.

On the latter, its devastating effects are well known; and on the former we learn from the private letter of a friend that "the hurri-"cane being from the East and N.E., the sea washed over a large "portion of the Islands. Two were nearly totally destroyed. The "whole population had been forced to escape from them, and on one "island alone the loss of cocoanut trees amounted to twenty thou-"sand." The gale was partially felt among the Laccadives: the easternmost, in all probability, suffered most. We also see by the *Bombay Times* (18th August,) that several of the Maldives were overflowed by the sea, and the inhabitants had to escape in boats; and are stated to have been at sea for many days, suffering great privations, before they reached the neighbouring islands.

Diurnal Rate of Progress.—The *diurnal progression* of the storm may be calculated from the successive positions of the vortex at noon. Having its formation to the Southward or S.W. of Ceylon, its onward movement was scarcely perceptible; but after the 14th, this may be calculated to have been nearly as follows—viz.

Date.		Distance.		Direction.
From 14th to 15th	108 miles, or $4\frac{1}{2}$ miles per hour.			N.N.W. $\frac{3}{4}$ W.
16th	129	$5\frac{1}{3}$	„	N.N.W. $\frac{3}{4}$ W.
17th	205	$8\frac{1}{2}$	„	N.N.W. $\frac{1}{2}$ W.
18th	220	$9\frac{1}{2}$	„	N. by W. $\frac{1}{2}$ W.
19th	160	$6\frac{2}{3}$	„	Northerly.
20th	140	$5\frac{5}{6}$	„	„
Near Shikarpore 24th	480	5	„	„

The distances from 16th to the 20th, are very near the truth, but from the latter to the 24th, when the focus was in the vicinity of Shikarpoor, we have assumed that it followed a due northerly direction, till its real path be ascertained.

It is quite impossible to define the limits of the hurricane, or to measure its diameter, because, as in other cases, the violence of the wind

apparently decreases from the centre towards the exterior in such regular gradation that one vessel will be lying to under bare poles near the former position, while another will be carrying top-gallant sails at the latter; and others will be under canvas according to the intermediate distances which they may chance to occupy between the two. Perhaps this comprehensive view may be objected to by rigid sticklers for the accepted meaning of the terms storm, hurricane, and typhoon. Yet, scientifically considered, we fear there is no alternative but to speak of the whole mass of atmosphere involved in a circular movement round a stormy vortex, as one phenomenon, whether as a gentle breeze at the periphery or blowing with the violence of a typhoon near the focus,—provided these are in conformity with the common centre. It certainly would be a far more easy task to coin a word expressive of the whole, than to explain the nature of the connexion that clearly exists between the external and internal parts of a gyrating disc of air. It is not the least curious part of the subject, that at 800 or 900 miles on every side of the moving focus, the atmospheric currents were blowing round it with greater or less strength and steadiness, and apparently little influenced by land or sea, lofty mountains or jungly plains.

Thus, while the stormy centre was skirting along the west coast of India, Northerly winds prevailed in the Arabian sea; Westerly, near Ceylon and the equator; Southerly and S.E., in the Bay of Bengal; and Easterly, in Scinde and upper Bengal. From whatever intermediate point, around or within this vast circle, we have any account of the wind, it is found not to have veered more than a point or two from its relative direction to the common centre, except near the coasts, where the land and sea breezes occasionally disturbed its uniformity. The diameter of the most violent and dangerous part was not much more than two hundred miles, while that of the great circuit within our cognizance was nearly fifteen hundred miles. In its early stages, however, it appears to have embraced the coast of Ceylon on one side, and the Maldives at the other.

Focus.—With regard to the *central calm*, or focus, that appalls the sternest mind far more than the wildest fury of the hurricane by which it is encircled, we have little information beyond the fact of its existence. When it passed over the *Buckinghamshire*, on the afternoon of the 18th, its diameter appears to have been about nineteen miles; assuming that the storm was travelling at the rate of nine and

a half miles per hour on that day, and the calm lasted two hours, according to extract from her log-book: and, as the gale re-commenced exactly at the opposite point from which it had suddenly died away, it is obvious that the centre passed directly over the vessel. The dimensions of this area, within which the "stormy winds" are so strangely hushed, coincides almost to a mile with those of the foci of the hurricanes which visit the Mauritius and its neighbourhood, and proves, by this distinctive and remarkable feature of rotatory gales, their perfect similarity in both hemispheres. There is reason to believe that this focal calm is most extensive and imperfectly defined during the formation of a hurricane near to the equator; and that it is only after the atmospheric currents acquire a circular movement at its circumference that the space becomes contracted to ten or twenty miles, and finally closes with the termination of the vortical force of the gale. It is more than probable that the central calm narrows and expands at different periods of the storm's duration; and as much obscurity exists regarding its passage over Bombay, we are inclined to think that there was a temporary abatement of the violent rotation and a dilatation of the focus, and that towards the tropic it again displayed its terrible powers.

Fall of Rain.—Rain is almost invariably a concomitant of circular gales, and during the Malabar storm we hear of its having fallen in "complete deluges" along the whole of its track from Ceylon to Scinde. In consequence of the eastern segment having impinged on the land, ample details of this fact may be gleaned from the Madras and Bombay newspapers. At Ceylon, from the 4th to the 12th April there was heavy rain, often "in torrents," with thunder and lightning and an easterly wind; and from the latter date to the 21st, south-westerly winds and "showers." We also ascertain that five hundred miles westward of this Island the *Buckinghamshire* had "incessant heavy rain," with northerly wind; and from the 14th till the storm reached Kurrachee, there are ample proofs of enormous and unceasing precipitation of vapour on every side of the vortex.

A Madura letter of the 17th April says—"It has been raining the "whole week, and especially the last two days it has been perfect "monsoon weather. The river has come down *fuller than for twenty "years* before, and the cotton of this season will be greatly damaged." At Coimbatore, "the quantity was not registered, but it is said to have

"been fully *equal to the aggregate inches of* 1846." The weather was the same at Trichinopoly, and a *fresh* in the Cavery carried away the Bridge at that place. "Heavy showers fell at Madras between the "15th and 22nd." At Tellicherry it was "one continued shower of rain. The rivers overflowed and inundated the paddy-fields and high-roads for the distance of four hundred yards. The whole line of the Western Ghauts was marked by similar weather. At Bombay, Ahmedabad, Mandavie, Deesa, Kurrachee, and Shikarpoor, heavy rain, quite unusual for the season, prevailed.

At three different place the fall of rain has been measured, and given in the following table :—

Date.	At the Observatory of Dodabetta. 8,640 feet above the Sea.			At Rutnagerry near the level of the sea.	Poona, 1,800 (?) feet above the sea.		
	Thermometer.		Quantity of Rain.	Quantity of Rain.	Thermometer.		Quantity of Rain.
April, 1847.	In the shade. Noon.	Wet bulb. Noon.	Inches.	Inches.	In the shade. Noon.	Wet bulb. Noon.	Inches.
15th	51·3	51·	0·01	... ...	...	...	... ...
16th	54·	52·	1·14	... ...	86·	70·	0·06
17th	53·	52·7	4·75	... ...	90·	71·	0·57
18th	53·	53·	10·00	1·50	80·	68·	0·26
19th	53·	52·5	1·72	4·07	70·	70·	3·05
20th	57·	54·	0·09	10·75	74·	68·	2·87
21st	53·	46·	... ...	1·45	78·	71·	... ...
22nd	... ...	... ...	... ...	... ...	...	...	... ...
23rd	... ...	... ...	... ...	... ...	...	...	... ...
Total....			17·71	17·77			6·81

At Tellicherry, 29 inches of rain fell during the storm.

The deposition of vapour would appear to have been greatest towards the commencement of the storm. The quantities that fell at Dodabetta in the Neilgherries, and at Rutnagherry on the sea coast, farther north, are nearly the same, but according to theory we would have expected a difference of several inches instead of a few hundredths between the two places, as the proportion of vapour in the atmosphere decreases upwards in a rapid degree. The sudden and extraordinary precipitation of rain, during rotating gales, amounting on the present occasion to fifteen inches in forty-eight hours, is,

in our humble opinion, likely hereafter to be one of the most important means by which a correct solution of the whole phenomenon may be obtained.

At Dodabetta, for example, the pressure of humidity observed was equal to ·400, and if the whole of this superincumbent vapour had been suddenly reduced to the form of rain, it would only have covered the surface to the depth of 5·24 inches. But, so far from anything of this nature having taken place, it was found that notwithstanding a deposition of water from the air equal to a depth of 17·71 inches, the proportion of vapour suspended in it was rather *increased* than diminished at the departure of the stormy mass of clouds that had shrouded the mountain for several days. It therefore follows, as a necessary inference, that a continuous supply of vapour was being brought into the sphere of condensation during the "incessant heavy "rain" so invariably noticed by all observers. It is equally evident, from principles which cannot be explained, that the South and S.W. winds were the vehicles which conveyed their load of moisture, imbibed at the equator, to the stormy circle. Dry hot winds preceded the hurricane, and wet, westerly, "monsoonish," weather followed. The theory of tropical storms is intimately connected with these facts.

At every other point of the storm there is little doubt that a similar state of things might have been detected. Had we possessed any information regarding the Barometer and hygrometrical state of the air during the fall of rain at Rutnagherry, results similar to those at Dodabetta would most likely have been obtained. At Poona on the 18th the pressure of moisture was ·574 when the rain was beginning to come down, yet, although more than six inches fell between this date and the 21st, there was an excess of vapour remaining in the atmosphere, to the extent of ·100, over that at the commencement, or a pressure of ·674. At Bombay the quantity of vapour in the air was augmented from ·709 to ·934 between the 18th and 21st, when the storm was sweeping past or over it.

Velocity of the Gale.—The *velocity* and *force* of the wind are not the least interesting points in our investigation, yet on this, as on most others, we possess only casual and imperfect snatches of information, on which little reliance can be placed, but quite enough to excite a keen desire for more extensive and complete observations on the subject when opportunities may offer. At one point alone we have exact information

for calculating the strength of the tempest, viz., at Dodabetta, where the force was equal to thirty pounds pressure on the square foot, when the gale was at South-east. Now it has been ascertained that to produce an effect equal to thirty pounds, the atmosphere, of the density of 30·00 inches of the Barometer, must be in motion at the rate of 80 miles per hour. It, therefore, follows, that at an elevation of 8,640 feet, with the air reduced in specific gravity to 22·0 inches, its velocity must have amounted to 109 miles per hour, to impress on the pressure plate of the anemometer the force of thirty pounds.

Near the focus, the violence of the typhoon appears to have been irresistible, and although not actually measured by a mathematical instrument, it is possible to understand the force that caused the foremast of the *Buckinghamshire*—"a beautiful stick of eight feet in "circumference,"—to bend, "like a Malacca cane," before the tempestuous blast by which it was finally blown away. The mainmast, *upwards* of eight feet in girth, was also snapt and torn out of the vessel, and one of the quarter boats was also forced out of its securings and carried across the poop like a feather.

Electrical Phenomena.—It is difficult to collect anything satisfactory regarding the extent, nature, and duration, of the electrical phenomena developed by the hurricane. It is quite certain, however, that electricity was evolved at different points of the whirling masses of clouds, from the 4th to 24th, as these progressed from Ceylon to the Indus; and, if we may conclude from the frequent mention made of its manifestations, the probability is that it was in constant activity during the whole time. But whether it was more abundant or intense at one side of the focus than another, is unknown. At Poona, an east wind, rounded cumulous clouds, lightning and thunder, to the South and S.E., were the harbingers of the storm; but after the clouds settled down on the earth, and the rain began to fall in horizontal sheets, the electrical discharges ceased.

Loss of Pressure in the Atmosphere.—The *diminished pressure* of the atmosphere at the centre of the hurricane, as indicated by the mercurial column, cannot be precisely ascertained, but it may be inferred to have been about two inches. Before the Barometers on board of the *Buckinghamshire* were broken, they were observed to stand at 28·35—about two hours before the ship got into the hurricane's centre. The sympiesometer, however, escaped; and when they

were actually in the focus it was found to be at 28·08: but as this instrument was known to have had a difference of from ·06 to ·08 above the broken barometers, the maximum depression may be estimated at 28·00 inches. While this was the case near the middle of the storm, at the distance of 600 or 800 miles towards the circumference, the Barometer was up to 30·00,—at Madras on one side, and in Lat 6′ S., Long. 56° 58′ E., (*Zemindar's* position) on the other.

The following table, compiled, with some difficulty, and from the readings of instruments of the relative standards of which we have no knowledge, give a tolerably correct idea of the level of the mercury at intermediate distances, from the ordinary pressure at the extreme towards the centre of greatest depression.

Barometer on the 14th April, 1847.			Barometer on the 17th April, 1847.		
Places.	Distance in miles from the focus	Barometer.	Places.	Distance in miles from the focus.	Barometer.
Madras.....	486	30·00	Zemindar.....	800	30·00
Trincomalee.....	320	29·90	Madras.....	300	29·97
Colombo.....	220	29·75	Colombo.....	300	29·86
S. Buckinghamshire	200	29·72	Victoria.....	120	29·75
			Cannanore.....	100	29·64
			Buckinghamshire	90	29·58
			Mermaid.....	60	29·35

State of the Barometer on 18th April, 1847.

Places.	Distance in miles from the focus.	Barometer.
Zemindar.....	900	30·00
Colombo.....	500	29·86
Madras.....	480	29·94
Rajcote in Guzerat.....	450	29·85
Bombay.....	240	29·70
Cannanore.....	130	29·78
Steamer Victoria.....	130	29·70
Ship Mermaid.....	80	29·36
Ship Buckinghamshire.....	20	28·35
Do. in the Focus.....	0	28·00

It is impossible to attain any degree of nicety in these calculations, as there are no means of correcting, or reducing the different instru-

ments to a common standard; yet it is satisfactory to see how nearly the altitude of the Barometers at a given distance on one day corresponds with that of another; and all agree in pointing to a gradual lessening of the weight of the atmosphere from the periphery towards the centre,—or more correctly speaking, the descent is in something of a geometrical degree of progression.

We must consider the pressure of thirty inches, as observed on board of the *Zemindar* within 800 miles of the storm's centre, in Lat. 6° and 7° North, as being somewhat *above* the ordinary standard in the neighbourhood of the equator about the equinox. The daily positions of the vortex were first deduced, and from these the distances of the ship and places were computed, in order to ascertain the relative level of the mercurial column; and the general accordance of the whole tends to show that our previous calculations of the path and diurnal stages of progression were nearer the truth than was suspected. The apparent, but really trifling, discrepancies between the fall of the Barometer at the same distance on different days, or between different places equally remote, are perhaps due partly to errors in calculation or imperfections in the instruments. On the whole, however, the results coincide with all that is yet known on this head.

Influence on the Tides.—A moment's reflection will show that a revolving gale sweeping along the shores of a narrow sea, must have great influence on the currents and tides of the ocean;—and the facts quite agree with such a supposition. Captain SINGLETON says—"The tides must have risen three or four feet above the highest "spring tides, and overflowed the paddy-fields in different directions, "within about 100 yards of the barracks." At Bombay there appears to have been "enormously high tides" during the passage of the storm. It is more than probable that the state of the Tide-gauge at Colaba may be obtained before this goes to press.

A removal of the weight of the atmosphere equal to two inches of the Barometer would be followed by an elevation of the sea beneath to the extent of 27 inches. Hence a storm wave of the circular form, having its apex under the focus, was carried along with the hurricane, followed by a current in its wake. In addition to this, the circular current, caused by the winds, round the vortex, must be taken into account as also tending to heap up the sea near the centre.

On the eastern side of the focus, the wind, storm-wave, and current, were all following the same direction along the coast. Thus it appears, by a correspondent of the *Madras Circulator*, that—"At "Calicut the sea was so rough, and the current *towards the North* so "strong, that several pattimars which were anchored in the roads, "and a French ship called the *Erneste*, were obliged to slip their "cables and run out to sea. You may form an idea of the strength "of the current from the fact that the Schooner *Nymph*, which left "Cochin for Colombo, was carried away far towards the north, and, "becoming unmanageable, struck on a reef of rocks off Tellicherry, "where she is now lying a wreck."

While a body of water was thus carried along the eastern side of the Arabian sea, it would naturally have flowed to the westward in front of the storm-wave and turned to the southward beyond the influence of the gale. The H. C. Steamer *Auckland*, on the passage from Aden to Bombay, first experienced this southerly current at the rate of fourteen miles per diem, on the 25th, in Long. 62° East, and found it to continue till the 28th, when she was in Long. 72° E.

The state of the sea seems to have been such as is usually met with during hurricanes. The nearer the centre the more "cross," "confused," and broken were the waves, and, as might be expected when tossed by violent wind in angry collision, they rose up in "py-"ramidal masses," thereby increasing the danger to ships in a manifold degree. A long heavy swell seems to have extended to many hundred miles beyond the area of the storm, and ought to have told of what was going on. The *Faize Rubahny* first experienced a heavy "confused sea" on the 15th, when off Mangalore, *two days before the vortex reached her.*

Causes.—In addition to the importance of the subject as affecting the lives and happiness of a large proportion of the human race, it must be confessed that a keen and abstract interest in the theory of storms has induced us to prosecute our research in spite of not a few unforeseen and even repelling obstacles. The hope, however vain, of penetrating into the mysterious forces which set this mighty tempest in motion, alone leads us through a dry detail of almost discordant facts. The accumulation of facts is subservient to the discovery of principles, and a theory is absolutely necessary to guide us in their arrangement. It may, therefore, be permitted us, without

seriously trespassing on the indulgence of our readers, to offer a few observations on the primary causes of storms. In the Indian ocean South of the Equator, the great hurricanes which annually sweep over its waters, are formed between, and in connexion with, two great opposing currents of atmosphere, and we think the same will be discovered to be the case with those of the coasts of India. As the principles and references necessary to illustrate this cannot now be brought forward with any degree of fullness, a glance at them can alone be given.

Primary Forces of a Rotatory Gale.—The two great trade-winds of the opposite hemispheres having an easterly direction and inclination towards the equator, are separated at the equator by the Line-westerly monsoon blowing in an exactly opposite direction, and unlike the former, its direction is obliquely FROM the equator. This great westerly current, like the trade winds, varies its position with the season, being north of the equator, under a northerly declination of the sun, and south, under a southerly,—blowing N. Westerly in the latter position and S. Westerly in the former; but it rarely extends beyond 10° or 12° degrees on either side of the Line. The vicinity of Islands or Continents derange these otherwise regular winds of the open ocean.

State of the Trade Winds, &c., in the Hurricane Month.—It seems to be a general law that the *hurricane season* of both hemispheres is that in which the sun is over it, and the trade wind is pushed farther from the equator, and its place temporarily occupied by the westerly monsoon just referred to. At the outer margin of the latter, or in the space of variables between it and the nearest or equatorial border of the trade wind, the vortices of great storms, revolving in accordance with the two great opposite currents at their reversed sides, are formed, and drift "en masse" to the westward, gradually turning toward their respective pole. Thus the N.E. trade deflecting from East to North, and the S.W. Monsoon of the equator turning back against it from West to South, give the specific mode of rotation, E.N.W.S. at the Northern hemisphere; and everything exactly reversed on the Southern side of the line. With such a palpable connexion between these regular currents and their stormy movements, we cannot refrain from placing them in the position of cause and effect; even without resorting to the additional arguments which might be adduced.

Monsoons of India connected with its Gales.—The N.E. Monsoon of India is in reality a part of the great trade wind, and the S.W. is merely an extension of the Line-westerly, caused by the great deserts and central tracts of Northern India and Southern Asia, when under the calorific agency of the Line. It is during the change of these monsoons that storms occur on the coasts of India, or neighbouring seas. All the rotatory gales so carefully examined by Mr. PIDDINGTON of Calcutta, have happened in April, May, or June ; or in October and November. On the recession of the S.W. monsoon, and setting in of the N.E., during the latter month, "the Elephanta," evidently a rotatory gale of more or less violence, is always expected on this coast.

Horsburgh, in his sailing directions for this coast, notices several gales which visited the western shore of India in October and November; and refers to a severe storm that happened about the 20th April 1782, "in which H. M. S. *Cuddalore*, the *Revenge*, and several "other ships, foundered with their crews ; the *Essex*, *Nancy*, and "others, were dismasted." He also informs us that a vessel foundered at her anchors in Surat road during the same gale, "owing to the "wind, tide, and high cross sea, from southward and westward."

However difficult it may be to assign the real causes of the late Malabar hurricane, yet analogy, reasoning, and ascertained facts, all point to their intimate connexion with the conflicting forces of an extraordinarily early S.W. or equatorial wind, and those of a protracted N.E. monsoon. For some weeks before the hurricane, winds from the *Eastward* prevailed over all India as far as Ceylon, and continued to blow with more or less strength and steadiness till the centre of the storm passed, after which all accounts from Scinde to Ceylon, and from the Arabian sea, agree in shewing the presence of *Westerly* winds and weather, such as attend the setting in of the S.W. monsoon. In the northern parts of the peninsula the latter did not become fixed, although at Ceylon and about the Southern extremity of India steady S.W. winds were in force up to the end of April. But that the agencies which set the S.W. or sea winds in motion, were developed long before the period of the year when they are expected, is manifest from the fact of the monsoon having been perfectly established at Bombay by the 22nd of May, being the earliest recollected for many years.

On the other hand, it is known that a rigorous winter and protracted chilly winds in spring, indicated severe cold in the North of Europe and Asia. On this, no doubt, depended the remarkable occurrence of heavy falls of hailstones over many parts of India, on the N.E. side of the hurricane, in April, and during the setting in of the S.W. monsoon in May. For instance, at Bancoorah, on the 4th April, "several severe *hailstorms* took place. Some of the pieces "were from three to four inches in diameter: cattle and human lives "were destroyed." On the 5th, a heavy storm of thunder, lightning, and rain, took place at Colombo, and the thermometer fell from 90° to 73°; and on the same day, at Manantoddy, "a pelting *fall of "ice"* lowered the temperature from 84° to 69°.

On the 15th April, while the hurricane was raging off Cape Comorin, and the *Ceylon Island* was near its vortex, "filling with water" after having had all her sails blown away, and the crossjack yard snapt in two by "the violent gusts of wind and rain," from S. and E., we find that Calcutta and Serampore were visited by "*hail-storms*," with the wind between N.E. and S.E. In connexion with this, we cannot refrain from quoting a few remarks "from a correspondent at Ootacamund" (on the Neilgherries) to the Bombay *Telegraph and Courier*, and dated the 17th April, who says:—"The Kondas on Mon-"day last (13th) came as it were within a giant's stride of the canton-"ment. That confused blending of forest with forest, and indistinct "grouping of the peaked hills decked out in their sombre livery of "greyish blue, now assumed the vivid colouring, the distinctness of a "new landscape, and an universal stream of light lit up those blue "mountains standing forth in bold outline against a hard blue sky; "over which hurried with racing speed thin streaks of white fleecy "clouds attended by several smaller satellites, black, wild, and ragged, "fleeing like birds of ill omen scared from their prey. Sailors would "have foretold a furious gale. Tuesday ushered in a high wind with "passing showers of rain. On Wednesday, the day of the eclipse, "the wind was blowing a strong gale from *East by South;* since the "15th it has been blowing furiously and from the same quarter, enve-"loping the country in a dense mist, accompanied by incessant rain."

Thus from Bengal to the centre of the storm, from 13th to the 15th, signs of an almost frigid N.E. current of air were obvious to observers. The logs of the *Buckinghamshire*, and *Zemindar*, show the condition of the weather on the opposite side of the vortex. One month

later, the commencement of the S.W. monsoon was marked by sharp tornadoes at Poona, where, on 22nd May, a fall of *hailstones* took place, most of which were as large as pigeons' eggs, and of the same shape.

All these facts shew that before the gale set in, the N.E. monsoon was predominating over India. The facts of an indraft of air or sea-breeze at the coasts, and calms or high winds near the heated surface of the plains, are mere local effects, confined to the very lowest stratum of air, at least till the mean heat of the earth increases to a certain degree. Over these early derangements, caused by solar agency, the Easterly currents, or great body of air, continues its course with little interruption till near the time of the S.W. monsoon. On the coasts of Scinde we have often seen the low rapid drift of light clouds carried out to sea by the easterly wind, while a gentle surface breeze was blowing inland from the westward. The masses of cold dry air borne by the N.E. monsoon, on coming in collision with the hot and humid S.W. winds from the opposite quarter, would, according to all the known laws of permanently elactic and other fluids, run into gyratory motion, mingle together, be reduced to a common temperature, and precipitate their superabundant moisture in the form of rain, or of *hail*, if this union took place near the level of congealation ;—and the phenomena would be prolonged, according to circumcumstances so variable in their nature that we cannot now advert to them.* The evolvation of electricity on such occasions is more or less remarkable according to the suddenness of the condensation, and rather appears to us to be a consequence of the change of vapour to the form of water than the cause.

Analytical comments on the late Gale.—It would be hopeless in our present state of knowledge to attempt an analysis of all the various phenomena that distinguish a rotatory gale, but certain known principles may assist in partially elucidating the complex relation that the most remarkable bear to one another. For instance, according to the laws of gravity, it follows that in a revolving mass of air with a diminished pressure of the superincumbent atmosphere near the centre equal to two inches of the Barometer, the surrounding column of the

* In the Malabar storm, from the copious fall of rain along with the East wind at the surface, it is almost certain that at a higher region of the atmosphere the hot and humid S.W. currents were blowing; while on the Southwest side of the circle the cold and dense N.E. wind was forcing itself under the N.W., and westerly, and causing those sudden squalls "coming up "against the wind" which were experienced by the *Swithamley* and *Sesostris*.

ordinary level, would press on all sides towards the focus of minimum resistance, and the pressure would be greatest on the densest layers resting on the surface of the earth, where the circular motion would assume an involute or helical direction, increasing in tempestuous gyrations as it approached the centre. For a continuance of the whole process, it is equally apparent that this centripetal tendency of the atmosphere at the base must be counterbalanced by a removal of air at the centre, by means of a focal current in a vertical direction at the point where the barometer is at its lowest range, and the stormy gusts cease to brush the surface in a horizontal direction, and cause that portentous calm which, strange to say, is the very core of the fiercest tempest. A rush of the ærial currents from the circumference towards the centre, would, even in a helical direction, restore a loss of pressure of two inches in an hour's time, and the vortical violence would be quickly ended if some agency did not exist at the upper parts of the focus capable of steadily withdrawing the ascending stream of air. In fact, the true explanation of this last cause may be considered as the key to the whole subject, but is a question that can never, in all probability, be practically determined,—its solution must alone rest on reasoning and analogy.

Height of the Rotatory Motion.—It is more than two years since we surmised that the circular motion of the atmosphere during great hurricanes extended to a much greater elevation than was generally admitted. This opinion has been now most fully confirmed by the observations made on Dodabetta, where the ærial currents were speeding round that part of the circle, at the height of nearly two miles perpendicular from the level of the ocean, and at a distance of one hundred miles from the focus, with a velocity of one hundred and nine miles per hour. Consequently, it may reasonably be inferred that far above this lofty peak the atmosphere was under the influence of the storm. The centrifugal action, consequent on revolving motion, would withdraw the atmosphere from the centre and throw it off towards the periphery. Thus, while a vast disc of atmosphere is in rotation at a level far above the surface of the earth, there must be *centrifugal action at the upper part* of the centre, where the atmosphere is light, and a *centripetal* movement among the lowest and densest strata, sweeping with vorticular violence to the focus; the strength of the latter being in the ratio of the former. The laws of hydrostatics, hydraulics, and pneumatics, may appropriately be referred to as

illustrating this part of the subject. A body of water in circular motion, as an eddy for example, exhibits the effects of centripetal action at the bottom and of centrifugal at the surface, where a concavity is formed in a degree corresponding to the rate of the motion. If the case is so in a fluid of equable density, how much more must these effects extend to a mass of atmosphere, under similar circumstances, but with its specific gravity rapidly decreasing in a geometrical ratio upwards.

Continuous causes.—The *continuous causes* of the rotatory action are due to the momentum imparted at reverse sides of the circle by two great currents of air moving in opposite directions, and pressing on the exterior of the stormy mass. As already alluded to, this seems to have been effected in the Malabar hurricane of April, by the westerly winds of the equator on one side, and the easterly monsoon near its recession on the other; the former deflecting by S.W. to South, and the latter by veering from East by N.E. to North; the permanency, strength, and direction, of the storm being dependant on the equipotence and combined action of the two, and its decadence, or irregularity, on ordinary disturbances to which both were liable, from circumstances sufficiently appreciable, but too numerous to be referred to in this paper. To one of these accidental causes of disturbance, peculiar to the season and natural configuration of the land, —viz. the vast extent of low sandy deserts of Northern India, Scinde, and Beloochistan, being heated at that period of the year to a much higher degree than the more southern parts of the peninsula, and giving rise to new currents at variance with the N.E. monsoon,—we are disposed to attribute the due northerly track of the vortex, and its less steady, strong, and well defined, movements after it passed Bombay than when on the Malabar Coast. Had the N.E. monsoon been setting in, or in its full strength, its impulse, applied to that side of the storm, would in all probability not only have augmented the violence of its gyration near the tropic but have pushed the whole mass more to the N.W., and given it the line of progression usually followed. Hence, as both the season and surface of the land combined to weaken the Easterly wind, the S.W. monsoon in its superior strength appears to have carried the vortex along the coast, and even over the western part of Scinde and Guzerat. This may also have been the case with the severe storm of 20th April 1782, which travelled up the Gulph of Cambay, and in all probability was influenced by the causes to which reference has just been made.

It will thus be seen that the primary forces which give birth to rotating storms in motion, are derived from those which are generally admitted by modern philosophers to support the trade-wind on one side, and the equatorial band of westerly winds on the other. These are the assignable causes which come within the scope of our observation, and appear to be fully adequate to the production of all the phenomena hitherto noticed during storms of a revolving nature originating within the tropics.

Suggestions on the means of avoiding Storms on the Western Coast of India.—Having pointed out the perils attendant on these whirling tempests, it may naturally be expected that some observations should be made on the means of avoiding them. However, very great caution is necessary in laying down arbitrary rules for the guidance of men who are unacquainted with the principles on which they are founded. We again repeat opinions published on a former occasion, that those who may turn to such works as these "in the expectation "of finding an easy and obvious method of escape from difficulties "hitherto nearly insurmountable, without any effort of the under-"standing or exercise of the judgment, will be disappointed." Our object has been to point out the nature of these storms, and if Commanders of vessels will only make themselves thoroughly acquainted with this, abstract instructions will be an unnecessary appendage to the subject. The question, in fact, appertains to Government and shipowners, on whom must ever devolve the real responsibility of not aiding in the extension of knowledge regarding storms, and making it incumbent on all their employés to know something of the matter. No human foresight can always guard against misfortunes, for circumstances, of so complex a nature, and so disastrous in their results as to baffle the efforts and ingenuity of the ablest and best of navigators, will no doubt occur too frequently; yet, if any means can be shewn of averting even a tithe of the loss of life and property caused by tropical tempests, they merit inquiry and a fair trial, instead of being treated as mere theories that cannot be reduced to any practical purpose.

Apart from the infrequency of typhoons on this coast, especially in April, that on the Malabar coast, by pursuing an unusual direction and impinging on the Maldive and Laccadive Islands and shoals on one side, and west coast of Ceylon and India on the other, was fraught with perils of no ordinary kind, and even if such a visitation

had been expected in the Arabian sea, it was hardly possible for ships in every instance to survive its overwhelming violence, even where there was no lack of vigilance, energy and intelligence. The tendency of the first half of the storm, by the combined influence of the wind and curent, was to drive vessels to the westward among the dangerous reefs of the above-mentioned islands; and the latter part to throw them back on the coast of India. Thus, at its setting in, the coasting craft were caught by the easterly wind, off shore, and by being swept across the path of the gale its focus passed between them and the land; while the veering of the wind to north and west, drove them round into its wake and restored them to their homes. For "three days" they were hurried from the land, and in as many more brought back to it. In the very helplessness of these country boats consisted their safety. By yielding to the commencing gale it bore them out of the more imminent danger, whereas, had they struggled against the increasing force of the wind to keep near the Indian coast, they would most likely have committed themselves to the mercy of the wind and waves, when too late to cross, but just in time to reach, the central path as the vortex was passing. Wonderful as the ways of Providence are in carrying such frail and open craft around so terrible a storm, yet there can be little doubt that too many of those whose fate must ever be unknown were destroyed under the circumstance last referred to.

To the large vessels from Bombay, bound to the Southward, whose course lay along the coast, the danger was very threatening; and, as the approaching typhoon spread itself across the channel, it rendered the ordinary means of escape most difficult. It was Scylla and Charybdis on either side, with a tempest between. There was time, but barely room, to shun the vortex, unless by having turned back to Bombay harbour. The *Faize Rubahny*, and *Mermaid*, on first finding the easterly wind increasing to a gale, appear to have kept well in with the land, so that when the vortex came up abreast of them they were at a sufficient distance to the eastward of it to avoid the most fatal part; and it was perhaps the very best thing which they could have done, if determined to prosecute their voyage: and had the storm travelled N.W., according to the ordinary laws, these ships would in all probability have wholly escaped.

Vessels meeting the Storm.—It is indeed very difficult to suggest any means of escape from such a storm as that of last April, which

clung to the Malabar coast in its northerly course, that would be applicable to all the varied circumstances in which a vessel may be placed, in reference to her distance and bearing from the centre and path of the storm, and from the nearest land or reefs,—in connexion with her navigable capabilities, propulsion by paddles or canvas, size, strength, cargo, &c. Suffice it to say, that, with the sea open to the westward, and the gale commencing from East to N.E., a ship ought to scud due west till the wind veers to North, then keep away S.W. and southerly, as the vortex will have passed. On the other hand, if the wind at East is changing to S.E., ships would do well to stand as much to the Eastward as possible till the gale is round to South or S.W. If near the coast, this must be attended by some hazard, but we suspect much less will be incurred than by lying to outside till the vortex passes over. When a vessel meets such a storm at East, and, owing to the Laccadive Islands dare not run west out of its way, she will have no alternative left but to cling to the eastern side of the channel till the wind is at South veering to S.W., when she may regain a good offing in the wake of the storm, before the westerly winds are fully established. If practicable, the most judicious step would be to return to Bombay harbour.

Much must depend on the distance of the focus from the shore. The exact bearing of this from a vessel and its path, can alone be discovered with accuracy by a previous knowledge of the laws of such phenomena. It will be too late to begin to study these at the moment when a hurricane is passing over the vessel; but to him who has the subject in his hand, a glance at the sea, sky, and barometer, in connexion with the force and veering of the wind, will, with a moment's reflection, enable him to reduce his principles to practice. When a gale increases, with the wind steady at one point of the compass, as East or E.N.E., it is obvious that the vortex is coming directly towards the ship; if veering to North on one side, or South on the other, then the centre is passing to the east or west, and the line of escape is readily discovered.

Fortunately the revolving gales of the Arabian sea generally drift N.W., by which vessels near the coast are in less danger. Supposing however, that another gale, like the one under consideration, was to visit the coast and the focus, instead of passing it at the distance of sixty or eighty miles was actually to impinge on the coast, vessels

might then keep to the westward of the vortex and escape its greatest violence without making too free with the Laccadives. Nor would the danger be very great near those reefs, because the winds would be northerly and N.W. as soon as it had passed.—So far, these comments on the means of avoiding any future and similar storms which may recur on the Malabar coast, have been wholly confined to the case of vessels going south and meeting it in their teeth, with land or shoals on both sides of the channel.

Ships overtaking the Storm.—A ship coming in contact with such a gale on its Western or Southern borders, can with great ease always keep out of harm's way. In the former case the N.E., North, and North W., winds will be available to lead her to the Southward till the veering of the wind indicates the passage of the storm to the Northward. The H. C. Steamer *Sesostris* entered the western side of the late gale, but being bound to Cannanore, the focus passed between her and the land before she got in shore. Had her course been to Bombay, she must either have hove to, or, by continuing her voyage, have been endangered by getting too near to the vortex. The *Swithamley* also got into the west side of the stormy circle, but, like a wise man, her commander, on finding the weather hourly getting worse as he kept on his course to N.E., put the ship about to S.W.; and by doing so invariably found the wind to decrease. He thus escaped the perils that lay between him and his destined port, till they passed away.

The *Ceylon Island* seems to have been on the east side of the vortex when it passed her on the 15th, half way between Colombo and Cape Comorin. This vessel subsequently followed in its wake, making a *fair* wind of the South West winds at its after half. Being a slow sailer she gradually dropped behind the gale, however. She came all the way from "Colombo to Malwan under bare poles"! A faster vessel, if not cautiously managed, might have run some danger of overtaking the gale.

As a general rule is as easy to be understood as to be complied with, vessels, after crossing the equator and bound to any of the northern parts of the Arabian sea, or the Persian Gulph, ought, on finding the Barometer falling, the wind increasing to a gale at West, accompanied by incessant heavy rain, and "a cross sea," to begin to suspect that they are running into a circular gale. By ly-

ing to, or standing away to the eastward, as the land will permit, the proximity and extent of the danger may both be ascertained and provided against.

The *Buckinghamshire* was more or less involved in the storm from the 13th to 20th, in consequence of her course being parallel to that of the vortex. On the 14th, she was in the westerly half of the circle, with bad weather at North and N.N.W., and as she neared the Island of Mincoy, the N.E. wind delayed her till the focus of the gale had passed from between her and the coast of India; and on the 17th, the gale veering to N.W. enabled her to run 120 miles to the eastward, passing through its equatorial side, crossing its wake, and getting in between it and the land of India. On the 18th, she availed herself of the strong southerly gale on the east side of the vortex, and ran along the coast N.N.W. and N.W. by N.; and current and wind being favourable, her speed was eleven to twelve miles per hour. Thus she ran up to the focus, passed ahead of it with the gale veering from S. by W. to South and S.E., and, in consequence of the jutting out of the coast near Vingorla, she was forced to keep off N.W. by W. at the very time when the vortex was assuming a northerly course and approximating the land. The result was most disastrous to this fine vessel, and, as we have seen, on the 18th, P. M., the most violent part of the tempest swept over her.

It is almost self-evident that had this ship hove to on the 18th, before she found the wind veering past South to the eastward, she would have escaped the more perilous part of the typhoon. Truth requires that this should be stated, and it is for the guidance of vessels in future, for the preservation of human life and property, that these remarks are made. But so far from attaching any blame to the officer in command of the *Buckinghamshire*, we think his conduct, under all the trying circumstances to which he was exposed, has been marked by intelligence, humanity, and zeal for the interest of his employers. He suspected the true nature of the storm, although there was absolutely no previous reason for expecting a rotatory gale at such a season. It was quite natural to avail himself of the southerly, and of course *fair*, winds at the east side of a vortical storm, and had it diverged from the land in accordance with the path commonly pursued by those noticed in Mr. PIDDINGTON'S works, all would have gone right.

But Captain MacGregor was actuated by other feelings of the most praiseworthy and humane kind. The greater part of his crew were laid up with scurvy, and, before the *Buckinghamshire* got into the gale, on the 11th April, it appears that "most of the Chinese, "and all of the Manilla, men were sick," and "*many were dead and* "*others dying*;" and on the 17th, no less than forty-nine of the crew were sick. Few require to be told that the most effective means of checking scurvey consists in fresh provisions, vegetables, and rest; and that the ravages of such a disease on board ship were to be apprehended far more than those that might possibly happen to a 1,400 ton vessel in a storm. Therefore, every effort was made to use a fair wind in running for a port almost within twenty-four hours' sail.

There is another vessel to which a very melancholy interest is attached—the H. C. Steamer *Cleopatra*, which left Bombay on the afternoon of the 14th April, bound to Singapore, with convicts, and had between 200 and 300 souls on board, since which time nothing has been heard of her. What the fate of this unfortunate vessel has been, we fear must ever remain a matter of mere conjecture, as not even a vestige of wreck belonging to her has been picked up to guide us in our surmises. It would almost be cruel to say aught to annihilate that hope which those who are deeply interested in the question, cannot yet resign, but, if we consider that the *Cleopatra* must have met the hurricane in her very teeth, and have been exposed to that frightful weather and sea which produced such crippling effects on the other ships that escaped, it is hardly credible that she should have avoided such serious damages as would have compelled her to put into some harbour on the coast,—a measure that might have easily been adopted, nay, almost forced on her, by the Westerly and S.W. gales consequent on the departure of the vortex.

It is most probable that the progress of the *Cleopatra* would be impeded by the currents and first part of the gale at S.E. if near the land, so that she would not have got near the focus of the gale till about the 17th, when it was off Mangalore. Supposing she ran along the coast at thirty miles distance from it, the increasing force of the gale at S.E. to East, aided by the storm current setting west, would, as she gradually approached the coming vortex, have driven her farther from the land, and consequently right on the central path,

when the overwhelming force of the tempest and raging sea is too likely to have caused the lamentable catastrophe so much dreaded. Had she been in shore, it is probable that she would have been seen or met by the other vessels, and that her escape would have been effected with some damage—perhaps as the *Victoria, Seaforth, Faize Rubahny, &c.*; or had she been carried sufficiently westward to be out of the path followed by the focus, she would, even if disabled, have been drifted round by the northerly and westerly winds, and, like the small country craft, have been brought towards the coast. It is a bare possibility, that if she was farther along the coast towards Ceylon than we suppose, she might have been well to the westward and swept in among the Laccadives: if so, her fate may yet be discovered.

The size or sea-going qualities of vessels cannot always be considered as a security for weathering a hurricane. H. M. S. the *Culloden* 74, and *Java* Frigate, foundered off Mauritius, while the *Harrier* Brig of War lived through the same storm. Yet in another tempest, which happened near the same place, in the following year, the *Harrier* went down, while the large ships of the fleet kept afloat Nor will science, foresight, and every possible precaution, always stave off misfortune. On board of a vessel tossed by angry winds, and half buried in pyramidal heaps of mountain waves, the wreck of a mast alongside may open a leak,—the rudder may be carried away,—a wheel rope snap,—or the steersmen be dashed from their post,—or other accidents may happen, by which the finest craft may, in a few minutes, be exposed to the most fatal disasters. These are points of seamanship with which we have nothing to do: we aim at little more than pointing out the danger, and recommending to all who can, to eschew the perils, of a stormy vortex in time, rather than to risk a collision in which nothing can be gained by a successful escape, while much may be lost in the struggle.

A. Thom.

APPENDIX.—No. I.

Meteorological Register at Trincomalie, on the East Coast of Ceylon, for April, 1847.

[Furnished by Dr. Roe, Deputy Inspector of Hospitals in Ceylon.]

Date.	Barometer.		Thermometer.		Winds.				Weather.		Remarks.
					Quarter.		Strength.				
	Max.	Min.	Max.	Min.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	
1	30·03	29·96	87	78	SW	East	1	3	B	B	
2	30·03	29·93	86	80	SW	SE to ESE	1	3	B	B	
3	29·95	29 93	87	80	SW	East	1	3	BC	B	
4	30·04	29 97	86	78	SW	East	1	3	BC	B	
5	30·06	29·98	85	78	SW	East	10	3	BC	BC	
6	30·06	29·98	85	78	East	East	4	4	BC	OL	
7	30·06	29·98	85	79	ENE	East	03	3	OGP	OLT	
8	30·04	29 96	85	76	SW.o	East	02	3·20	OETP	BCOLT	
9	30.00	29 91	83	76	o	North	0	12	OLTR	BC	
10	30·00	29·92	81	75	Vble	East	0·41	1·23	OQETR	BCOLR	
11	29·97	29·87	79	75	EbyN	E by N	6	6	OLTR	BCOLTR	At 9. 30 P. M. strong squalls from SW.OLTR.
12	29·96	29·87	82	76	East	East	5	4	OQLTR	BCP	
13	25·97	29·87	84	76	oSW	E by S	01	4·32	BC	BOP	
14	29·97	29 90	84	77	South	E by S	3	5	BC	BC	
15	29·94	29·83	84	79	EbyS	E by S	5	62	BCM	OLTR	This is generally the most oppressive month in the year: light see breeze by day and calm sultry night. Thermometer generally 87° all night.
16	29·95	29·83	83	76	ENE	s to s w	01	40	BCT	OLTR	
17	29·95	29·84	83	73	StoE	E to s w	14	40	BC	OLTR	
18	29·94	29·88	82	74	SWSE	ESW	1	20	BC	OLTP	
19	29 95	29·89	84	75	SWtoS	ESW	1	3·41	BC	OLTR	
20	30 02	29 90	84	75	SW	North	21	04	BC	OULT	
21	29·98	29·88	85	77	SW	WSW	1	4	BC	OLTU	
22	29·98	29·90	86	77	SW		3	3	BC	BC	
23	29·96	29·87	87	78	SW	NE by s	3	3	B	B	
24	29·97	29·91	87	78	SW	SW	4	4	B	B	
25	29·97	29·88	87	76	SW	SW	45	4	B	B	
26	29·94	29 86	89	77	SW	SW	4	5	B	B	
27	29·90	29 86	89	77	SW	SW	56	56	B	B	Perfect S. W. Monsoon weather, although early.
28	29·92	29·86	89	79	SW	SW	5	54	B	B	
29	29·91	29·85	88	79	SW	SW	5	53	B	BC	
30	29·95	29·87	87	79	SW	ESE	4	13	BC	B	

Strong movements.

Note.—B, denotes Blue sky; C, Cloudy; D, Drizzling rain; G, Gloomy; L, Lightning; M, Misty; O, Overcast; P, Passing showers; Q, squally; R, Rain; T, Thunder; U, Ugly appearance.—Adopted at the Greenwich Observatory.

No. II.

Meteorological Register, Colombo in Ceylon, for April, 1847.

[Furnished by Dr. Roe, Deputy Inspector of Hospitals in Ceylon.]

Date.	Thermometer.			Barometer.		Winds.	Atmospheric Observations.	
	Morning	Mid-day	Night	Morning	Evening	Day and Night	Day.	Night.
1	76	90	78	29-90	29-90	N E	Clear and	Dry
2	76	87	83	29-90	29-90	do	Cloudy, dry	Cloudy
3	78	89	80	29-92	29-90	Vble	Clear, dry	do
4	78	87	82	29-92	29-92	East	Cloudy	Thunder, lightning & rain
5	78	85	76	29-92	29-96	—	do	do do in torrents
6	78	86	78	29-95	29-95		do	do do
7	78	84	76	29-95	29-90		do	Rain
8	78	84	78	29-90	29-90		Clear	Showers
9	76	85	77	29-90	29-90	Vble	Cloudy	Rain, thunder & lightning
10	76	85	78	29-90	29-90		do	much do do do
11	75	82	75	29-85	29-85		do	do
12	74	82	78	29-80	29-80	High wind Vble	Showers	
13	76	82	78	29-80	29-85	—	Cloudy	
14	76	89	78	29-90	29-75	Windy	Showers	Showers
15	76	84	80	29-78	29-75	do	do	do
16	76	85	86	29-80	29-76	V W	do	do
17	76	86	78	29-80	29-86	do	do	do
18	76	84	78	29-86	29-86	do	do	do
19	76	87	82	29-90	29-90	Mild	Dry	Clear
20	76	85	82	29-90	29-90		Much rain	
21	78	84	80	29-95	29-95	—	Cloudy	Showers
22	78	84	82	29-93	29-90		do	do
23	80	86	82	29-89	29-90	S W	Clear, dry	
24	80	89	83	29-92	29-90	Windy	Cloudy	Clear
25	80	87	82	29-90	29-90	S W	Windy, Clear	Dry
26	80	88	82	29-90	29-90	do	do do	
27	82	89	82	29-92	29-92	do	do Cloudy	Dry
28	82	89	82	29-90	29-90	do	do Clear	
29	83	90	82	29-90	29-90	do	do do	
30	82	90	83	29-90	29-90	do	do do	

No. III.

Meteorological Observations, made at the Observatory on Dodabetta (8,640 feet above the level of the sea.)

[The following document was sent by Dr. St. John, Deputy Inspector of H. M.'s Hospitals at Madras.]

Date. 1847.		Barometer.	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.	H	Inches.	°	°	°	°	lbs.		
D 15	0						7 0	E by N	
	1						7·0	E	
	2						6 0	E	
	3						5.0	E ¼ N	
	4						4·0	E N E	
	5						3·0	E N E	
	6						4·0	E N E	
	7						2·5	E by N	
	8						2·0	E by N	
	9						1·5	E	
	10						1·5	E	
	11						2·5	E	
	12						4 0	E	
	13						5·0	E	
	14						7·0	E	
	15						10·0	E	
	16						8·0	E	
	17						7·0	E	
	18						8·0	E	
	19						8·0	E	
	20						9·0	¼ S	
	21						10·0	E ¼ S	
	22	21·998	51.8	51·3	—	47·0	6·0	E ¼ S	o. m.
	23						3·0	E by S	
16	0						3·0	E S E	
	1						4·0	E S E	
	2						3·0	E by E	
	3						4·0	E	
	4	21·912	51·5	51·0	50·0	—	5·0	E ¼ N	
	5						7 0	E ¼ N	
	6						9·0	E ¼ S	
	7						8·0	E by S	
	8						7.0	E by S	
	9						12·0	E	
	10						12·0	E ¼ S	
	11						12·0	E ¼ S	
	12						10·0	E by S	
	13						8·0	E by S	
	14						12·0	E S E	
	15						12·0	E S E	
	16						10 0	E S E	
	17						12·0	E by S	
	18						12 0	E S E	
	19						13·0	E S E	
	20						15·0	E S E	
	21						13·0	E S E	
	22	21·946	54·0	52·5	—	48·5	15·0	E S E	o. r. r.
	23						18 0	E by S	
17	0						22 0	S E by E	
	1						22·0	S E by E	
	2						23·0	S E by E	
	3						27·0	S E by E	
	4	21·888	53·0	53·0	53·0	—	28·0	S E	o. r. r.
	5						20 0	S E ¼ E	
	6						30 0	S E ¼ E	

Dodabetta Observations Continued.

Date. 1847.		Barometer.	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.		Inches.	°	°	°	°	lbs.		
D	H								
	7						30·0	S E ½ E	
	8						30·0	S E ½ E	
	9						25·0	S E ½ E	
	10						20 0	S E	
	11						20·0	S E	
	12						20·0	S E ½ E	
	13						20·0	S E by S	
	14						20·0	S by E	
	15						20·0	S W by S	
	16						20·0	S W by W	
	17						20.0	S W by W	
	18						20·0	S W by W	
	19						18·0	N E by N	
	20						15·0	S S E	
	21						12·0	S E by S	
	22	22·016	53·0	52·7	—	51·5	10 0	S by E	o. r.
	23						12·0	S E by S	
18	0						8 0	S E ½ S	
	1						12·0	S E by S	
	2						12·0	S E by S	
	3						17·0	S by E	
	4	21·952	53·5	53·0	53·5	—	13·0	S	o, m.
	5						15·0	S by E	
	6						18 0	S by W	
	7						17·0	S by W	
	8						15·0	S by W	
	9						17·0	S S W	
	10						16·0	S S W	
	11						16·0	S S W	
	12						16.0	S S W	
	13						13 0	S S W	
	14						13·0	S S W	
	15						12·0	S S W	
	16						15·0	S S W	
	17						15·0	S S W	
	18						18·0	S by W	
	19						20 0	S S W	
	20						15·0	S by W	
	21						10·0	S S W	
	22	22·056	53·0	53·0	—	49·5	10·0	S W ½ S	c. v.
	23						4 0	W S W	
19	0						7·0	W by S	
	1						4·0	W by S	
	2						3·5	W by S	
	3						2·5	W	
	4						2·0	W	
	5						3·0	W S W	
	6						3·0	W by S	
	7						7·0	N N W	
	8						7·0	E by N	
	9						8·0	E N E	
	10						5·0	E N E	
	11						6·0	E N E	
	12						5·0	E N E	
	13						7·5	E by N	
	14						7·5	E by N	
	15						6·0	E by N	
	16						6·0	E by N	
	17						3·0	E by N	
	18						4·0	E ½ E	

Dodabetta Observations Continued.

Date, 1847.		Barometer.	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.	H	Inches.	°	°	°	°	lbs.		
D	19						2·0	E	
	20						2·0	E by S	
	21						0·5	E by S	
	22	22·138	53·0	52·5	—	47·4	0·5	E by S	
	23						0·5	S W by W	
20	0						0·3	W by S	
	1						0·3	W by N	
	2						0·3	W	
	3						0·3	W S W	
	4	22·056	54·0	54·0	57·8		0·2	S W	
	5						0·4	S W by W	
	6						0·0	S W by W	
	7						0·0	W	
	8						0·2	W S W	
	9						0·6	W S W	
	10						0·3	W by S	
	11						0·1	W S W	
	12						0·0	W by S	
	13						0·1	W by S	
	14						0·1	W	
	15						0·3	W by S	
	16						0·3	W	
	17						1·2	W	
	18						1·6	W	
	19						0·8	W	
	20						0·6	W ½ N	
	21						0·2	W by N	
	22	22·126	52·0	51·0		48·0	0·2	W	b. v.
	23	·124	55 0	52·0			0·1	W	—
21	0	·116	55·0	52 0			0·3	W N W	—
	1	·100	57·0	52·5			0·2	W N W	—
	2	·092	57·5	52·0			0·3	N W	—
	3	·080	57·0	52·0			0·4	W by N	—
	4	22 078	57·0	52·5	61·5		0·2	W by N	—
	5	·084	55·0	50·5			0·4	W by N	—
	6	·084	53 0	5 ·0			0·3	W by N	—
	7	·086	52 0	48·0			0·6	W by N	—
	8	·094	51·5	51·5			0·6	W N W	—
	9	·118	51·0	45·5			0·7	W by N	—
	10	·118	51·0	44·8			0·7	W N W	—
	11	·110	50·0	44·0			1·0	W N W	—
	12	·081	50·0	44·0			1·0	W N W	b.
	13	·070	50·0	44·0			1·0	W by N	—
	14	·054	50·0	44·0			0·8	W by N	—
	15	·050	50 0	44 0			0·4	W by N	—
	16	·048	50·0	43·5			0·3	W by N	—
	17	·050	49 5	42·5			1·7	W by N	—
	18	·064	50·0	42·0			2·0	W by N	b. v.
	19	·084	51 0	41·5			1·4	W by N	—
	20	·096	51·0	43·0			1·5	W by N	—
	21	·119	51·5	45·5			0 2	W by N	—
	22	22·128	53·0	46·0		49·5	0·7	W	—
	23						0·7	W by N	
22	0						1·0	W by N	
	1						0·4	W N W	
	2						0·0	W N W	
	3						0·0	W N W	
	4	22·072	55·0	52·0	62·0		—	—	b. v.
	5						—	N W by N	
	6						—	N W by N	
	7						—	N W by N	
	8								

Dodabetta Observations Continued.

Date. 1847.		Barometer	Thermometer.				Wind.		Weather.
			Dry.	Wet.	Max.	Min.	Force.	Direction.	
April.		Inches.	°	°	°	°	lbs.		
D	H								
	9						0·0	N W by N	
	10						—	—	
	11						—	—	
	12						—	—	
	13						—	—	
	14						—	—	
	15						—	—	
	16						—	—	
	17						—	—	
	18						0·1	W N W	
	19						0·2	—	
	20						0·0	—	
	21						—	W by N	
	22	22·128	54·0	49·0	—	49·5	—	W	b. v.
	23						—	N W	
23	0						—	N N W	
	1						1·0	N N W	
	2						0·2	N N W	
	3						0·3	N by W	
	4	22·060	58·0	54·8	61·9		0·3	N by W	c. h.
	5						0·3	N by W	
	6						0·6	N by W	
	7						0 4	—	
	8						0·0	—	
	9						—	—	
	10						—	—	
	11						—	—	
	12						—	—	
	13						—	—	
	14						—	—	
	15						—	—	
	16						—	—	
	17						—	—	
	18						—	—	
	19						—	—	
	20						—	—	
	21						—	—	
	22	22·128	55·5	54·0		49·5	—	—	c. v.
	23						—	—	

N. B.—The Barometer and Thermometers at the Observatory on Dodabetta are registered at 10 A. M and 4 P. M. daily, with the exception of the 21st of each month, when hourly observations are made. In the column weather, b represents blue sky, *b* represents that one half of the sky is cloudless, and B perfectly clear sky; c, represents cloudy ; o, overcast; r, rain; r r, continued heavy rain ; f, fog ; m, mist or drizzling rain; v, shews that the air is clear, inasmuch as distant objects are very visible; and *v*, that a more than ordinary clearness prevails.

	Inches.
Rain measured at 10 A. M. on April 15th	0.01
16th	1·14
17th	4·75
18th	10 00
19th	1·72
20th	0·09
21st	0·00
22nd	0·00
23rd	0.00
24th	0·00

The mark — in the columns devoted to the wind, represents that the air was too light to act on the vane or pressure plate.

(Signed) T. G TAYLOR,
H. C. Astronomer.

No. IV.

Meteorological Observations at Tellicherry, in April, 1847.

[Furnished by Surgeon MacGregor, H. M.'s 25th Regiment.]

Date.	Winds, from 15th to 22nd April last.	Weather, from 15th to 22nd April last.
April 15th,	Fresh Southerly winds during the day.	Cloudy hazy unsettled weather.
	At sun set the winds came at the S.E. and hauled round the East N.E. and N.	With threatening appearance all round.
	Fresh breeze, variable at South, and towards morning light, dies off the land.	Cloudy, with thunder, lightning, and drizzling rain.
16th,	Light variable breezes at S. to S.E. and E. during the day.	With thick hazy weather, and drizzling rain.
	Fresh breezes, variable at S.E. to E. during the night.	Cloudy, with thunder, lightning, and and slight rain.
17th,	Throughout the day strong breezes variable at S. to S.E.	With thick cloudy weather and slight rain.
	Hard squalls at the Southward during the night.	Cloudy, with thunder, lightning, and heavy rain at times.
18th,	Light breezes at the Southward, during the day.	Cloudy, with rain at intervals.
	Squally variable at S. to S.E. during the night.	Cloudy, with thunder, lightning, and heavy rain at times.
19th,	First part of the day squally at the Southward.	With heavy rain, dark cloudy unsettled weather, and distant thunder.
	Latter part of the day moderate breezes at the Westward.	With fine weather.
	Fresh breezes at the Southward during the night.	Cloudy, with slight rain, thunder, and lightning at intervals.
20th,	Moderate breezes, variable at S. to W., during the day.	Chiefly fine weather. Towards sun set squally appearance over the land, with distant thunder.
	Fresh breezes at the Southward during the night.	Cloudy, with thunder, lightning, and slight rain at times.
21st,	Moderate breezes variable at the S. to S.W. and West during the day.	Fine weather.
	Light breezes at Southward during the night.	Cloudy, with thunder, lightning, and slight drizzling rain at times.
22nd,	Moderate breezes, variable at S. to S.W. and West, during the day.	Fine weather.

N. B.—From the 15th up to the 23rd April last, a heavy surf rolling in upon the beach.

No. V.

Meteorological Observations made at the Garrison Hospital at Cannanore, in April, 1847.

Month and Date.	Thermometer.			Barometer.			Rain.		Wind.		Morning.	Forenoon.	Afternoon.	Evening.	Night.
April 16th	85	86	85	29·712	29·650	29·660	...	1	N E	N E	Much overcast and still.	Much overcast wind S E	Densely overcast and drizzling, wind NE	Overcast & d rizzling rain	Drizzling throughout
17th	81	79	79	29·640	29·616	29·656	...	13	S E	S E	Much overcast and rainy.	Much overcast squall and rainy WSE	Densely overcast and drizzling wind SE	Rainy with thunder a nd lightning	Rainy and squally
18th	79	79	79	29·720	29·712	29·742	6	3	S E	S E	Drizzling with occasional showers.	Frequent heavy showers with occasional thunder	A very heavy shower at 1 o'clock with occasional thunder, attended lightning SE	Frequent heavy showers attended with very loud peals of thunder	Rainy
19th	79	83	81	29·786	29·788	29·820	5	8	S W	S W	Very cloudy and close with some drizzling.	Clearing up cumulus, wind S	Cloudy with short intervals of sunshine, SW	Fair and cumulus	Clear
20th	80	83	81	29·868	29·846	29·862	...	...	S W	S E	Fair and cloudy cumulus,	Cloudy with intervals of sunshine, wind SW	Very cloudy. A slight shower at 3 P M with some thunder. Wind W	Fair and cumulus	Cloudy with sheet lightning and a strong shower between 8 and 9
21st	79	84	83	29·878	29·866	29·884	...	3	E	N E	Fair and cloudy cumulus.	Sunny and a slight shower of rain at 8 A M & hot cirro-cumulus winds S	Sunny and cumulus, wind W	Fair and cumulus	Clear
22nd	80	86	84	29·846	29·866	29·872	...	...	N E	NW	Fair and cirrus horizon cumulus.	Clear cumulus SW	Clear cumulus Wind W	Clear horizon strato cumulus	Clear
23rd	80	87	85	29·850	29·824	29·828	...	...	N E	NW	Clear horizon cumulus.	Clear sun powerful cumulus towards NE wind W	Clear and breezy —wind NW	Clear and breezy; horizon cumulus	Clear
24th	82	88	86	29·864	29·828	29·860	...	...	N E	NW	Cirro-cumulus and still.	Clear E and N E cumulus, breezy Wind NW	Clear and windy —wind NW	Clear and breezy —horizon rather overcast	Clear and breezy

No. VI.

Meteorological Observations made at the Magnetical Observatory, Bombay—April, 1847.

(Furnished by Captain MONTRIOU, I. N.)

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky	State of the Weather.
April 1847. H		°	°			lbs.		
14th Noon.	29·781	85·8	79·2	0·903	N W	1·30		Cirri and light fleecy Clouds, extending from the N horizon to the S W horizon (by East)
" 2	29·727	85·8	79·0	0·895	N W by N	2·08		Cirri, scattered, in the E, S E, and S
" 4	29·706	83·8	78 2	0·884	N N W	2·08		Light Cumulus in the East, and Cirrostratus in the S W
" 6	29·726	81·0	77 4	0·882	" " "	2·08		Mist in the horizon
" 8	29·761	80·5	76·5	0 852	" " "	0·78		Clear; lightning in the East at 8h 30m
" 10	29·784	80·1	76·5	0·856	" " "	0 52		Clear
" 12	29·776	79·0	75·0	0 810	" " "	0·05		Nimbi in the East and South horizon
" 14	29·732	77·8	75·0	0 823	" " "	0·05		Stratus in the East horizon
" 16	29·721	77·6	75·2	0·836	" " "	0·00		Black Clouds like Cirrostratus in the East
" 18	29·746	75·1	74 0	0 815	N by W	0·00		Cirrostratus from S E to N W horizon; Mist all round
" 20	29·777	81·5	76·2	0·829	N by E	0·78		Cirrocumuli in the S E, S and S W horizon: do
" 22	29·763	85 5	78·5	0·878	N by W	0·52		Light fleecy Clouds, and Cirri, scattered all round the horizon: Cirrocumuli in the South
15th Noon.	29·716	85·3	80 0	0·943	N W by N	0·99		Mist in the horizon
" 2	29·664	84 7	79·4	0·f 24	"	1·50		A few Cumuli in the E; and Cirrostratus in the W.
" 4	29·623	84·0	79 0	0·915	"	2·08		Light Cirrostratus, and Cirrus scattered throughout
" 6	29·645	81·7	78·7	0·928	N W	1·30		Cirrus, Cirrostratus and Cirrocumulus scattered throughout: Mist in the horizon
" 8	29·676	80 2	78 0	0·915	N N W	0·52		Nimbus in the North, N E and S E
" 10	29·691	80·0	78·0	0 917	"	0·00		Nimbi scattered, but Zenith clear: lightning in the E horizon
" 12	29·694	79·0	78·0	0·928	N W by W	0·05		Nimbi scattered throughout. At 12h 30m wind changed from N W by N (round by S) to S W by W
" 14	29·672	78·8	77 2	0·897	S W by W	0·52		" " " " At 14h 30m wind returned to W S W (round by S)
" 16	29·644	78·6	76 4	0·870	W N W	0·26		Cirrostratus, and Cirri scattered throughout
" 18	29·674	76·5	76·0	0·876	N by W	0·05		Cirrus, Cirrostratus, and Cirrocumulus, scattered throughout: Mist in the horizon
" 20	29·716	84 0	79 2	0·923	N E	0·05	W.	Cirrus, and Cirrostratus throughout: Mist in the horizon
" 22	29·729	86·6	80·0	0 928	N W	0·05	W	Cirrus, and Cirrostratus, moving N Eastward; thick black Mist extending from N horizon to S (by W). From 20h 0m to 22h 0m wind changed regularly from N E (round by S) to N W by W, and at 21h 20m it returned to S

Bombay Meteorological Observations continued—April, 1847.

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky.	State of the Weather.
April 1847. H		°	°			lbs.		
16th Noon.	29·697	87·6	81·0	0·960	N W	0·05	W	Cirri and Cirrostratus throughout : black mist extending from N to S horizon (by W)
,, 2	29·646	87·8	81·0	0·968	N W by W	0·10		... ...
,, 4	29·597	84·8	80·2	0·956	N W	0·78		... ...
,, 6	29·630	82·1	79·5	0·957	,,	0·52	W	Nimbus like clouds in the horizon : lightning, in continued flashes, in the SE horizon. At 7h 20m wind changed from NW to SW (round by S)
,, 8	29·658	80·6	79·0	0·952	S W by S	0·36		Nimbi scattered throughout, lightning in the SE horizon
,, 10	29·693	81·3	79·0	0·945	S	0·47		... ... From 12h 35m to 13h 05m wind changed regularly
,, 12	29·682	82·2	79·4	0·951	S by W	0·26		from S by W to N W
,, 14	29·631	81·1	79·3	0·959	N W	2·08		... ... A light squall of wind which lasted for some minutes
,, 16	29·630	80·3	78·0	0·914	,,	0·52		Nimbi : zenith partly clear
,, 18	29·657	78·5	76·5	0·874	N by E	0·05		Nimbus from N to S (by E) ; Cirrus and cirrocumulus throughout : mist all round the horizon
,, 20	29·698	86·9	79·4	0·900	N E by E	0·36		Cirrocumulus throughout, mist in the horizon
,, 22	29·709	94·2	79·7	0·832	E N E	0·05	W	Cirri and cirrostratus above, and light fleecy clouds below, fleecy clouds and black mist in the horizon, the latter extending from N to S (by W). At 22h 20m wind changed from ENE to WNW (round by N)
17th Noon.	29·661	91·2	82.0	0·965	N W	0·52	W	Cirro and cirrostratus moving gently SE ward ; light fleecy clouds throughout
,, 2	29·599	87·2	80·5	0·943	N W by N	2·60	W	Dense masses of Nimbi, and Cumulostratus in the E : dense fleecy clouds and cirri scattered in the remaining parts of the sky

17th April. No Observations are made from 4 P. M. on Saturdays, till 4 P. M. on Sundays; but as the appearance of the atmosphere indicated an approaching change, although the instruments (Magnetic and Meteorological) remained steady, partial observations were made until midnight, when the atmosphere began to clear, and the wind moderated. The direction of the wind was nearly N W from noon to 6 P. M, when it suddenly changed (by the S) to SE, and its force increased from 1·78 to 3·0 lbs. At 7 P. M, the whole of the Sky became overcast, and the wind due S; at 8 P. M. large drops of rain fell, and the wind changed to SE; at 9 P. M. to the N of the Zenith began to clear, and the wind changed to S by W (round by S) and blew a little fresh. It remained nearly in this direction until 18h 40m, when it changed (by W) to NNW; at 19h 0m it was due N; at 20h 40m it changed to NE, and at 20h 40m it came back (by N) to NW, where it remained until 29 minutes past noon of the 18th, when it suddenly changed to E (round by S) and backed in about 5 minutes to SE, in which direction it remained till sun-set, blowing in strong gusts, from 2·25 to 3·50 lbs.

Date and Observatory Mean Time.	Barometer Corrected to 32° Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky	State of the Weather.
April 1847.		°	°			lbs.		
18th Noon.								
" 2								
" 4	29·628	91·3	76·0	0·714	S E	2·08	W	Cirrocumulus, and fleecy Clouds through out : Wind squally
" 6	29·666	86·5	73·5	0·670	S E by E	1·56	W	
" 8	29·670	84·4	72·4	0·653	E	0·05	W	Cirrus, cirrostratus and fleecy clouds throughout
" 10	29·703	84·5	72·5	0·661	E by S	0·99	W	Cirrostratus and fleecy cloud ... ith partly clear
" 12	29·663	83·0	73·0	0·690	E	1·30	W	Nimbi scattered throughout
" 14	29·632	81·7	73·0	0·705	"	1·56	W	Nimbi scattered : light clouds in the zenith, through which some stratus are dimly seen
" 16	29·635	80·4	73·0	0·720	"	0·49	W	Nimbi throughout : a few drops of rain
" 18	29 669	79 8	71·8	0·682	N E by N	0·52	W	Nimbi throughout
" 20	29·702	81·8	72·6	0·689	N E	0·05	W	Nimbi throughout, and cumulus and stratus in the horison : raining very lightly
" 22	29·705	85·5	74·2	0·709	"	0·47	W	... ... Raining lightly
								... ...
19th Noon.	29·671	91·6	76·0	0·710	N E	0·47	W	
" 2	29·639	85·2	74 0	0·704	E	1·56	W	Nimbus extending from NE to S horison (by E) : dense fleecy clouds throughout
" 4	29 590	82·8	72·3	0·667	N E	2·08	W	Overcast with Nimbi, raining
" 6	29·620	78 0	73·0	0·746	N E	0 78	W	... ... At 4h 30m the force of the wind increased to between 4 & 5lbs
" 8	29·634	79·7	74 0	0·764	E	1·30	W	... ...
" 10	29·656	78·5	74·5	0·797	E by N	0·99	W	... ...
" 12	29·655	76·0	73·0	0·768	N	0·78	W	... ...
" 14	29·628	75·8	74·0	0·807	N N E	1·04	W	... ...
" 16	29·633	75·7	74·0	0·808	"	0·05	W	... ...
" 18	29·672	78·0	75·0	0·821	N E by N	0·42	W	Nimbi moving Westward : cumulus and stratus in the horison
" 20	29·725	78·9	76·0	0 850	N E	0·10	W	... ... raining. (Total fall of rain, 0·31 inches.)
" 22	29·708	79·2	75·6	0·831	N E by E	0·26	W	Nimbi : raining

Bombay Meteorological Observations continued—April, 1847.

Date and Observatory Mean Time.	Barometer Corrected to 32d Fhr.	Air Thermometer.	Wet Bulb.	Pressure of Moisture.	Wind. Direction.	Wind. Force.	Extent of Cloudy Sky.	State of the Weather.
April 1847. H		°	°			lbs.		
20th Noon.	29·676	82·3	77·0	0·852	N N E	0·36	W	Nimbi and dense fleecy clouds
" 2	29·649	86·9	78·0	0·841	"	0·21	W	... ...
" 4	29·627	84·9	78 0	0·863	N N E	0·05	W	... ... A shower of rain at 3h 52m
" 6	29·656	82·0	79 0	0·937	N W by W	0·42	W	... ... At 4h 50m wind changed (by N) to N W
" 8	29·694	81·4	79·0	0·944	W N W	1·04	W	... ... part of a rain-bow visible in the SE
" 10	29·704	80·5	78·5	0·933	"	0 36	$\frac{3}{4}$	Nimbi: masses of dense fleecy clouds moving SEward: zenith partly clear.
" 12	29·693	79·5	78·5	0 944	"	0·26	$\frac{1}{4}$	[shining brilliantly
" 14	29·662	80·0	77·0	0·877	N W by N	1·04	$\frac{1}{4}$	Nimbi scattered in the horizon: lightning, in continued flashes, in the S horiz: stars
" 16	29·668	78·7	77·0	0·891	N N W	0·00	$\frac{3}{4}$	Black clouds, like cirrostratus, scattered along the horizon: lightning in the S
" 18	29·722	78·6	77·4	0·908	"	0 00	$\frac{3}{4}$	... ...
" 20	29 754	82·2	79·0	0.935	N W by W	0·05	W	Nimbi and fleecy clouds, below: cirri and cirrostratus, above, moving southward
" 22	29·756	85·0	79·4	0·920	W N W	0·42	W	Nimbi and fleecy clouds, the latter below and moving S Eastward
								Nimbus extending from the N (by E) to S, dense fleecy clouds moving to the W:
21st Noon.	29·763	87·6	80·0	0·916	W by S	0·52	W	black mist extending along the horizon from NW (by W) to SW
" 2	29·706	88·2	79·5	0·889	W	1·04	W	Cumuli in the horizon from N to S (by E); and cirri throughout: electrical cumu-
" 4	29 697	84·7	78·0	0 836	W	1 30	W	li in the S: a solar halo
" 6	29·736	82·7	77·7	0·875	"	0·36	W	Cumuli in N, E and S horizon; Nimbi in the S; and cirri and cirrostratus throughout
" 8	29·762	81·9	77·4	0·872	"	0·52	W	Nimbi scattered throughout, and Cumuli in the NE and N
" 10	29·783	81·0	77·4	0·882	W by S	0·16	$\frac{3}{4}$	Nimbi, and dense fleecy clouds throughout
" 12	29·765	80·5	76·8	0·863	"	0·36	W	... ...
" 14	29·729	80·0	76·2	0·846	"	0·52	$\frac{1}{4}$	Nimbi in the horizon from N to S, (by E); and Cirri and Cirrostratus through-
" 16	29·728	79 7	76·2	0·845	"	0·26	$\frac{1}{4}$	out: a lunar halo
" 18	29·779	79·8	77·2	0·887	"	0·05	$\frac{3}{4}$	Nimbi scattered around the horizon
" 20	29·831	84·8	78·8	0·898	"	0·21	$\frac{3}{4}$	Black Clouds, like Nimbus, scattered in the E, NE, and SE
" 22	29·846	86·5	79·7	0·917	W S W	0·10	W	Detached masses of Nimbi moving from E to W
" 24	29·825	88·0	80·5	0·934	W by S	0·26	W	Cirrocumuli: and Cumuli and Mist in the horizon: fleecy clouds between them
								moving N Eastward
								Cumuli and Mist in the horizon; fleecy clouds moving NE: and Cirrocumuli:
								Zenith clear
								Cumuli in the horizon: Nimbus in the E, S, and NE: Nimbi moving in a central
								direction to the wind
								Dense fleecy clouds, like Nimbus, throughout

No. VII.

Note on the state of the Weather at Sedasghur.

[Furnished by Surgeon MacGregor, H. M.'s 25th Regiment.]

Weather very cloudy and threatening for several days, before the 16th April, when the wind blew very strong from the East, about 9 o'clock P. M., and by 12 o'clock it had increased to a gale, which continued till about 12 o'clock A. M. of the 17th, by which time the wind had got round gradually to the monsoon quarter, S.W. During the night, the Thermometer fell at least 8 degrees in my house, which is in an exposed situation on the top of a hill. Thermometer at 8 in the evening of 16th stood at 84°; by the morning it was 76°. After 12 o'clock on the 17th the wind moderated a good deal, though it blew pretty hard the remainder of that day, and the 18th, with rain. Two or three pattemars were wrecked even in the back water, which is a good deal sheltered to the southward. The tide must have risen three or four feet higher than the highest spring tides, and overflowed the paddy-fields in different directions, within about 100 yards of the barracks.

Signed) G. SINGLETON, Captain,
Commanding Sedasghur.

Sedasghur, 3rd *June*, 1847.

No. VIII.

Meteorological Observations made at the Madras Observatory.

[The following was furnished by Dr. St. John, Deputy Inspector of H. M.'s Hospitals at Madras.]

Date 1847.			Barometer.	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
April.			Inches.	°	°	lbs.		
D	H	M						
15	0	41	29·972	91·0	79·9	0·5	S	Cum Cir & Cir haze.
	1		·939	91·0	80·0	0·5	S S E	... ...
	2		·922	90·3	79·9	0·2	S	Cum Cir haze & Cir strat.
	3		·918	89·9	79 9	0·3	S by E	... ...
	4		·924	88·4	79·2	0·1	S by W	Cum Cir & Cir haze.
	5		·931	87·1	79·1	0·1	S	... ...
	6		·948	86·0	79·0	0·1	S by W	... ...
	7		·959	85·2	78·8	...	S S W	... ...
	8		·976	84·8	79·0	...	S by W	... ...
	9		30·000	84·6	79 0	...	S by W	... ...
	10		30·010	84 5	79 0	...	S by W	... ...
	11		29·994	84·4	79·0	...	S S W	... ...
	12		·981	84·1	79·0	..	S by W	Cir haze, & Cir Cum.
	13		·964	83·9	78·8	0·1	S by W	Overcast, sheet ltg S W.
	14		·940	83·7	78·7	...	S by W	.. ..
	15		·930	83·5	78·5	...	S by W	Nearly overcast.
	16		·932	83·4	78·8	Calm	S S W	Cir Cir haze and Cir str.
	17		·944	83·2	78 8	Calm	S W by S	Nearly overcast Nimbi.
	18		·968	81·9	78·1	Calm	W S W	Nimbi, rain, thunder.
	19		·998	82·4	78·3	Calm	S W	Nearly overcast Nimbi.
	20		30·004	84·0	79·0	0·1	S W	... ...
	21		29·990	85·3	78·3	0·8	S S W	... ...
	22		·994	86·1	78·1	0·4	S by W	Nearly covered cum & cir.
	23		·979	86·7	78·1	1·1	S by W	Nearly overcast cir cum

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
D	H	M	Inches.	°	°	lbs.		
16	0	41	29·946	85·2	78·2	0·4	S	..
	1		·918	85 2	78·3	0·2	S	..
	2		·912	85·1	78·1	0·3	S	...
	3		·900	84·4	78·1	0·2	S	...
	4		·904	83·7	77·0	0·2	S by W	...
	5		·911	83·1	76·9	...	S S W	...
	6		·922	82·7	77·0	...	S S W	Overcast
	7		·940	82·6	77·1	Calm	S W by S	Cum Cir cir haze lightg E
	8		·949	82·6	77 3	...	S W by S	Cum in horizon
	9		·970	82·0	77 0	...	S W by S	Cum and cir haze
	10		·976	81·8	77·0	...	S W by S	.. ..
	11		·950	81·6	77 0	Calm	S W by S	Cir cir hazé & cir str.
	12		·931	81·5	77·2	Calm	S W by S	Overcast
	13		·912	80·5	77·3	Calm	S W by S	... str ltg S W.
	14		·882	80·4	77 5	Calm	S W by S	... light rain.
	15		·886	80·5	77·7	Calm	S S W	...
	16		·912	80·5	77·7	Calm	S S W	...
	17		·922	80·4	77·8	Calm	S S W	... light rain.
	18		·952	80·7	77·8	Calm	S S W	... ...
	19		·986	81·6	78·2	Calm	S W	... ...
	20		30·004	81·3	77·3	Calm	S S W	... ...
	21		·022	82·0	77·4	...	S by W	... ...
	22		·014	84·1	77·9	...	S by E	Cum cum str, cir str.
	23		29·998	84·3	77·9	...	S by E	... ...
17	0		29·970	85·4	78·1	...	S	Cum cir str and cum str.
	1		·932	84·7	78·1	...	S S W	... ...
	2		·910	85·0	78·4	0·1	S S W	... ...
	3		·906	85·0	78·5	...	S by W	... ...
	4		·926	83·9	78·5	...	S by W	Overcast. Nimbi S W.
	5		·939	83·1	79·0	Calm	S by W	... very light rain.
	6		·954	82·4	78·8	Calm	S W by S	... ...
	7		·964	82·0	78·2	Calm	S W	... ...
	8		·992	81·3	77·0	Calm	S W by W	.. ..
	9		30·012	81·3	77·0	Calm	S W by W	..
	10		·020	80·7	76·7	Calm	W S W	..
	11		·008	80·4	76 4	Calm	W S W	.. light rain.
	12					Calm	W S W	
	13					Calm	W S W	
	14					Calm	W S W	
	15					Calm	W S W	
	16					Calm	W S W	
	17					Calm	S W by W	
	18					Calm	S W	
	19					...	W S W	
	20					...	W S W	
	21					...	S W by S	
	22					0·1	S	
	23					0·7	S by E	
18	0					0·8	S by E	
	1					0 7	S	
	2					0·5	S	
	3					0·3	S by W	
	4					0·3	S by W	
	5					0 3	S by W	
	6					0·1	S S W	
	7					0·1	S S W	
	8					0·2	S W	
	9					0·1	S W	
	10					...	S W by S	
	11					Calm	S W by S	
	12		29·968	81·8	77·4	Calm	S W by S	Cum in horizon.
	13		·956	81·3	77·0	...	S W by S	Cir haze and heavy cum.
	14		·944	81·3	77·0	...	S W by S	Heavy Cum and Nimbi.
	15		·934	81·0	77·0	...	S W by S	.. ..

During this day, (*Sunday*) was experienced: Thermometer. 84·6 87·5 82·4
cirrus, cirrus-haze, and cirrus stratus in the morning and at noon, with cumulus and cirro-cumulus at night. Barometer. 30·032 29·928 30·000
H
At 10 A. M
4 P. M
10 P. M

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer.	Thermometers.		Wind.		Remarks.
				Dry	Wet.	Force.	Direction	
1	1.	2.	Inches.			Ins.		
Dec.	16.	4.	29·940	80·4	76·0	0·1	S W	.. ..
	17.		·952	80·1	76·1	...	S W	Scattered cum & cum str
	18.		·980	81·2	77·0	...	S W lgt W	.. ..
	19.		29·044	82·3	76·0	0·2	S W lgt W	.. cir & cir haze
	20.		·026	85·0	78·8	0·6	S W	.. ..
	21.		·029	87·6	78·6	0·6	S W	.. haze
	22.		·022	86·4	78·6	0·5	S S W	.. and cirri
	23.		·011	90·6	80·0	0·5	S	.. ..
	24.	0.	29·981	91·1	80·1	0·2	S	Scattered cum & cirri
		1.	·956	90·6	80·0	1·2	S	.. ..
		2.	·931	89·7	80·1	1·6	S	.. and light cirri
		3.	·913	89·1	79·6	1·6	S	Cum and cirri
		4.	·906	87·5	79·5	1·6	S	Cum and Cir-haze
		5.	·924	85·6	79·2	1·3	S	.. ..
		6.	·940	86·6	79·3	1·0	S	Lt Cir haze over head. Heavy cum & cum str W. horizon. S. Ltg SW horizon.
		7.	·954	87·9	79·5	1·0	S lg W	Lt Cir Cir-haze W hor, S ltg S W hor
		8.	29·966	87·6	79·5	1·1	S W lgt S	Cum and .. .. ..
		9.	·934	87·7	79·6	1·2	S W	Nearly overcast. S ltg in NW
		10.	·926	87·9	79·2	0·6	S W lgt S	.. and very light rain
		11.	29·986	80·9	79·7	Calm	S W lgt S	Cum & cir haze S ltg in NW
		12.	·962	80·7	77·8	Calm	S W lgt S	Overcast, S Lightning W
		13.	·980	80·5	76·8	Calm	S W lgt S	..
		14.	·965	80·3	77·4	Calm	S W lgt S	.. S Lightg NW
		15.	·965	80·0	76·8	Calm	S W	..
		16.	·979	79·5	78·6	Calm	S W lgt W	Nearly overcast
		17.	·990	79·5	78·0	Calm	S W lgt W	Cum cir, cir-haze, & cir-str
		18.	30·028	80·0	78·7	Calm	S W lgt W	.. .. ..
		19.	·046	82·0	78·3	Calm	W	.. .. ..
		20.	·072	85·0	77·0	Calm	W N W	Cir Cir haze and Cir strat
		21.	·070	88·6	78·5	Calm	W lg N	.. .. ..
		22.	·050	90·5	80·0	0·1	S S W	Cum cir, haze & cir strat
		23.	·042	90·4	80·0	0·1	S	.. .. & cir
Dec.	25.	0.	·010	90·1	79·8	0·1	S	Cum cir str & cir haze, cum str S & W
		1.	29·980	90·3	79·0	0·2	S	.. ..
		2.	·956	90·2	78·5	0·2	S	Cir strat and cir haze
		3.	·932	89·5	78·5	0·2	S by E	Cum cir str and cir haze
		4.	·930	87·4	79·0	0·2	S by E	Cir strat and cir haze
		5.	·939	86·2	79·2	0·3	S	.. ..
		6.	·942	85·0	79·0	0·2	S by W	Cir cir str & cum S ltg S W & W
		7.	·960	84·5	79·0	0·1	S S W	Cum cir cir str & Cir haze halo round) S ltg S W
		8.	·987	84·4	79·5	0·4	S W by S	.. .. ..
		9.	30·000	84·3	80·0	0·6	S W by S	Cir Cir-haze & cum S lightg in S W
		10.	·000	84·0	80·0	0·7	S W by S	.. ..
		11.	29·994	84·0	80·0	0·4	S W	Lt .. ..
		12.	·989	83·8	79·8	0·2	S W	um & Cir-haze, S ltg S
		13.	·972	83·6	79·3	0·2	S W by W	Cum in horizon
		14.	·951	83·0	78·5	0·1	S W	Cum & Cir-haze in horizon
		15.	·944	82·4	78·0	...	S W	Clear
		16.	·952	82·0	77·6	...	S W	Cir Cir-haze & Cir strat
		17.	·974	81·6	77·5	Calm	S W	..
		18.	·996	82·1	78·1	Calm	S W	.. .
		19.	30·016	84·0	79·0	...	S W by W	.. ..
		20.	·034	87·2	78·0	0·1	W by S	Cir & Cir-haze
		21.	·034	90·0	76·4	0·3	W by S	..
		22.	·022	92·4	76·9	0·4	W by S	..& Cir-strat
		23.	·000	94·3	76·0	0·5	W by S	Nearly clear. Lt cir & cir str

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force	Direction.	
D	H	M	Inches.	°	°	lbs.		
21	0	41	29·970	96·0	77·0	0·1	W by S	Cir, cir-str—Cum in N hozn
	1		·947	95 8	80·2	0 1	S E	Scattered cum & lt cir-strat
	2		·928	91·6	79 8	0·3	S E	... Cir & cir-str
	3		·918	90·6	79·7	0·2	S E by E	Cum cir & cir-str
	4		·916	88·8	80·0	0·4	S E by E	Cir & cir-haze
	5		·922	87·4	80·0	0 3	S E by E	Lt cir cir-str & cir-haze
	6		·942	86 1	79·5	0·1	S E by E	... ...
	7		·966	85 6	80 0	...	S E	Light cir haze
	8		·990	85·3	80 3	...	S S E	... ...
	9		30 010	84·9	79·9	...	S by E	Nearly clear
	10		·004	84·7	79·8	...	S by E	Clear
	11		29·998	84·4	80 0	...	S	..
	12		·961	84·0	79·8	...	S by W	..
	13		·944	84·0	79 6	0·1	S S W	...
	14		·946	83·5	79·3	0·2	S W	...
	15		·942	83 3	79·2	0·1	S W	...
	16		·948	82 8	79·0	...	S W	...
	17		·969	82·5	78·8	...	S W by W	Cir & cir-haze in N horizon
	18		·990	83·9	79·6	...	S W by W	... & Cir-haze
	19		30·004	85·7	77·1	...	W S W	Lt cir-haze & cir-str in hor
	20		·032	87·4	74·4	0 2	W	.. & Cir-str
	21		·031	90·4	75·0	0·1	W N W	Light haze & Cir-str
	22		·026	93·3	76·7	...	N W	... ...
	23		·007	94·7	78·0	...	E by N	Lt Cum & Cir-haze
22	0		29·980	93·8	77 0	0·1	E	Scattered Cum W & N
	1		·952	93·3	76 8	0 2	E by S	Nearly clear, Cum W & N h
	2		·936	93·5	78·9	...	E S E	... ... W horizon
	3		·916	91·7	78·4	0·2	S E	Cum, Cir, Cir-haze
	4		·916	90·5	78·0	0·2	S E by S	Cir & Cir-haze
	5		·924	88·2	78·2	0·1	S E by S	Nearly clear
	6		·936	86·7	78 2	0·1	S S E	Lt cum & haze in horizon
	7		·952	85·8	78·3	...	S E by S	Clear
	8		·963	85·3	78·3	...	S E by S	..
	9		·974	84·7	78 1	Calm	S by E	..
	10		·971	84·6	79 0	Calm	S	..
	11		·958	84·4	79 6	Calm	S S W	..
	12		·930	84 0	79·5	Calm	S W	...
	13		·920	83 3	79·0	Calm	S W	...
	14		·900	83 0	78·5	Calm	S W by S	...
	15		·894	82·5	78 0	Calm	S W by S	...
	16		·912	81·9	77·3	Calm	S W by S	..
	17		·934	81·5	77·4	Calm	S W by S	Cir & Cir-haze
	18		·950	83 5	77·5	Calm	S W by S	Nearly clear.—Cir & cir-haze
	19		·976	85·7	78·7	...	S W	Cir & Cir-haze
	20		·994	88 3	79 3	...	S W	Nearly clear. Light haze
	21		30·006	91·3	78·0	0·1	W	...
	22		·003	94·0	78·1	0·1	N W	Light Cir
	23		29·982	95·4	73·4	0·1	E by N	Scattered cum & Cir-haze
23	0		·957	94·0	79·7	0·1	E S E	Cum in W
	1		·929	93 3	80·0	0·4	S E by E	...
	2		·907	91·7	79 0	0·5	S E	Scattered cum & haze
	3		·891	91 2	79·2	0·6	S E by S	Nearly clear. Lt cir & cir-h.
	4		·898	90 0	78·8	0·4	S S E	... Lt cir-haze.
	5		·900	88 3	78·9	0·4	S S E	... ...
	6		·916	86·6	78·6	0·3	S by E	...
	7		·932	86 0	78·3	0·1	S by E	Clear
	8		·950	85 7	78·7	...	S by E	...
	9		·968	85·5	80·1	0·1	S by E	...
	10		·978	85 2	80·4	0·1	S S W	...
	11		·964	85 0	80·6	...	S by W	Flying clouds & cir-haze
	12		·944	84·7	80·3	...	S S W	Clear
	13		·930	84·0	79·4	...	S W	...
	14		·921	83 5	78·8	...	S W	Lt Cum in horizon
	15		·922	82·8	78·0	0·2	S W	... ...

Meteorological Observations made at the Madras Observatory continued.

Date 1847.			Barometer	Thermometer.		Wind.		Remarks.
				Dry.	Wet.	Force.	Direction.	
D	H	M	Inches.	°	°	lbs.		
23	16	41	29·930	82·0	76·5	0·2	S W	Clear
	17		·952	81·6	76·4	0·2	S W	... light haze
	18		·978	83·0	77·1	...	S W	Lt Cir, & Cir-haze
	19		30·040	85·3	78·2	0·4	S W by W	Cir, Cir-str, & Cir-haze
	20		·016	87·3	77·0	1·1	S W by W	Nearly clear
	21		·028	89·6	76·2	0·7	S W by W	Light Cir-haze
	22		·014	83·8	76 9	0·2	S by E	Quite clear
	23		29·980	95·3	77·8	0·1	S b E	Lt scattered Cum
24	0		·963	93·1	81·8	0 2	S S E	Light scattered Cum
	1		·930	93·2	80·4	0·2	S S E	Cum from N to W
	2		·897	9 ·3	80·2	1·2	S E by S	... in W
	3		·862	9 ·5	79 7	0·9	S E by S	... in W horizon
	4		·838	96·0	79.8	1 1	S E by S	... ...
	5		·900	8 ·7	80·0	0·8	S S E	... ...
	6		·928	86·6	80·0	1·1	S S E	... & Cir haze
	7		·950	86·0	80·4	1·0	S S E	Covered with cum, forming Nimbi W
	8		·974	85·8	80·5	0 7	S by W	Cum and haze
	9		·988	85·4	80·3	0·8	S by W	Cum, Cir, & Cir-haze
	10		·982	85·0	79·8	0·4	S by W	Cum, cir-cum, cir, & cir-hse
	11		·968	84·8	79·2	0·3	S by W	Nearly covered with cum, cir, & cir-haze
	12					0·3	S S W	
	13					0·4	S W by S	
	14					0 4	S W by S	
	15					0·4	S W by S	
	16					0 2	S W	
	17					0 2	S W	
	18					0·1	S W	
	19					0·4	W S W	
	20					0·1	W S W	
	21					...	W S W	
	22		30·004	93·8		...	W S W	Clear. Lt haze.
	23					...	S E	

N. B.—The date begins to reckon from Noon. The Barometer requires to be corrected for temperature, and the "force" represents the pressure in lbs. on a square foot. The times are for 0h 41m, 1h 41m, and 2h 41m &c., corresponding to the even hours of Gottingen Mean Time.

T. G. TAYLOR,

H. C. Astronomer.

No. IX.

Meteorological Register kept at the Surveyor-General's Office, Calcutta, for the Month of April, 1847.

Latitude 22° 33′ 26″·33 North. Longitude 88° 23′ 42″·84 East. Magnetic Variation 2° 28′ 36″ East. Magnetic Dip 27° 45′.

[Sent by Mr. PIDDINGTON, of Calcutta.]

Days of the Month.	Observations Made at Sun rise.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from Sun set to Sun rise.	
	Inches.	°	°	°		
1	29· ,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	,,	,,
3	29·800	75·0	75·8	73·0	S	Clear,
4 S	·830	80·0	81·0	76·5	S	Cloudy,
5	·887	78·5	79·5	77·0	S	Mists,
6	·925	78·8	79·8	77·0	S	Cloudy,
7	·905	77·0	77·0	76·0	S	Clear,
8	·811	78·5	79·4	77·0	S	Clear,
9	·771	78·5	79·8	77·8	S	Mists,
10	·771	80·0	81·0	78·9	S	Cloudy,
11 S	,,	,,	,,	,,	,,	
12	·855	73·0	75·0	73·0	S E	Cloudy, ,,
13	·847	69·4	70·0	69·0	E	Cloudy,
14	·828	75·0	75·2	74·0	S E	Cloudy,
15	·822	70·4	71·0	70·0	N E	Cloudy,
16	·776	73·5	74·5	73·0	E	Cloudy,
17	·743	69·0	69·8	69·0	Calm	Cloudy,
18 S	·768	75·2	76·0	73·2	S E	Cloudy,
19	·709	74·0	74·4	72·0	N E	Cloudy,
20	·695	78·2	79·0	77·8	S	Cirro Cumuli,
21	·687	75·8	77·0	74·0	S	Clear,
22	·700	75·0	75·3	72·2	E	Clear,
23	·637	77·0	78·0	75·0	No observn.	Clear,
24	·664	81·5	82·0	80·0	Ditto	Cloudy,
25 S	·640	82·0	83·0	81·0	S	Cloudy,
26	·642	78·0	78·5	74·0	S	Cloudy,
27	·682	79·8	80·1	74·6	S	Cumulo strati,
28	·732	82·0	83·0	80·0	S	Cirro Cumuli,
29	·687	81·5	82·4	79·8	S	Clear,
30	·728	81·4	82·0	79·0	S	Clear,
Mean.	29·762	77·0	77·7	75·3		

Calcutta Meteorological Register continued.

Days of the Month.	Maximum Pressure. Observed at 9h 50m. Barometer reduced to 32° Fahrenheit.	Temperature. Of the Mercury.	Temperature. Of the Air.	Temperature. Of Wet Bulb.	Wind. Direction from 8m rise to 9 h. 50 m.	Aspect of the Sky.
	Inches.	°	°	°		
1	29. „	„	„	„	„	
2	„	„	„	„	„	„
3	29·854	86·7	86·8	78·2	S (high)	Clear, „
4 S	·890	88·0	87·5	80·0	S (high)	Cumuli,
5	·946	89·0	88·0	79·2	S W	Cumuli,
6	·975	88·5	87·7	79·4	S	Cumuli,
7	·940	88·5	88·0	80·5	S	Cumuli,
8	·865	89·5	89 0	82·0	S (high)	Clear,
9	·811	89·0	89·0	81·5	S (high)	Clear,
10	·847	89·0	89·0	81·0	S	Cloudy,
11 S	·871	89 0	89·1	82·0	S	Cumuli,
12	·886	88 0	88 5	79·0	S (high)	Cumuli,
13	·880	83·0	81·0	77·2	E	Cloudy,
14	·878	86·0	85·1	78·2	S	Cumuli,
15	·843	83·0	82·0	77·2	E	Cumuli,
16	·789	85·0	84·0	79·5	S	Cloudy,
17	·837	77·5	77·0	71·0	N E	Cumuli,
18 S	·831	86·0	85 0	80·0	S E	Cloudy,
19	·798	87 5	85·5	77 0	S	Cirro-strati,
20	·730	89·8	90·0	81·0	S	Cirro-Cumuli,
21	·722	89·0	89·0	82·0	S	Cumuli,
22	·738	90·0	88·3	80 2	S	Cumuli,
23	·685	88·0	88·0	82·4	„	Cloudy,
24	·708	91·0	90·8	84·0	„	Cumuli,
25 S	·679	92 0	91·0	83·0	S	Cumuli,
26	·716	90·3	89·3	81·0	S	Clear,
27	·743	93·0	92·4	80 5	S	Clear,
28	·761	91·1	91·0	82·1	S W	Cumuli,
29	·747	91·5	91·2	81·8	S	Clear,
30	·773	91·0	91·0	82·8	S	Cumuli,
Mean.	29·811	88·2	87·6	80·1		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at Apparent Noon.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from 9h. 50m. to Noon.	
	Inches.	°	°	°		
1	30. „	„	„	„	„	„
2	„	„	„	„	„	„
3	29·862	87·0	86·0	79·2	S (high)	Cloudy,
4 S	·862	89·5	89·0	80·2	S (high)	Cumuli,
5	·925	93·0	92·7	79·0	N E	Cumuli,
6	·945	92·4	92·0	79·5	S	Cumuli,
7	·898	92·7	92·4	82·2	S	Cumuli,
8	·820	94·5	91·8	82·0	S	Clear,
9	·785	91·5	91·0	82·0	S (high)	Cumuli,
10	·817	91·5	91·0	82·0	S	Cloudy,
11 S	·847	93·5	93·0	82·0	S	Cumuli,
12	·832	89·5	89·2	80·8	S (high)	Cumuli,
13	·836	85·5	84·5	79·0	N	Cloudy,
14	·869	87·0	86·5	79·0	S	Cumuli,
15	·786	87·8	87·2	81·0	S E	Cumuli,
16	·750	89·4	89·5	81·0	S	Cumulo-strati,
17	810	77·4	77·0	72·0	E	Cloudy,
18 S	·781	91·0	89·0	80·2	S	Cumuli,
19	·762	89·5	88·2	78·3	S	Cloudy,
20	·692	95·0	95·2	79·0	S W	Cirro-strati,
21	·697	93·1	93·0	84·0	S	Cumuli,
22	·684	93·5	93·0	83·5	S	Cumuli,
23	·656	93·5	93·0	83·0	„	Cumuli,
24	·672	95·0	94·0	84·0	S	Cumuli,
25 S	·657	95·0	94·5	84·5	S	Cumuli,
26	·697	95·5	95·0	84·0	S W	Clear,
27	·723	97·5	97·3	80·2	W	Cirro-Cumuli,
28	·728	95·0	95·0	80·5	S	Cumuli,
29	·705	96·0	96·0	84·0	S	Clear,
30	·752	95·0	94·0	83·0	S	Clear,
Mean.	29·780	91·3	91·2	81·0		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at 2 h. 40 m.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from Noon to 2h. 40m.	
	Inches.	°	°	°		
1	29. "	"	"	"	"	"
2	"	"	"	"	"	"
3	29·872	89·5	90·0	80·0	S	Cumuli,
4 S	·813	91·9	91·0	80 8	S (high)	Cumuli,
5	·845	96 5	95·1	84·1	N E	Clear,
6	·875	95·5	94·4	78·8	S	Cumuli,
7	·789	96·0	95·9	82·5	S	Cumuli,
8	·721	98 3	98·9	83·0	S W	Clear,
9	·713	98·7	98·0	82·0	S (high)	Clear,
10	·709	97·8	98·0	78·2	S E	Cloudy,
11 S	·775	93 6	92·5	81·5	S	Cloudy,
12	·828	75 0	74·4	71·0	E	Cloudy,
13	·739	89·0	88·5	81·0	S	Cloudy,
14	·775	90·2	90 0	77·0	S	Cumuli,
15	·677	84 0	94·0	80·0	S E	Rain, Thundering,
16	·653	91·5	90 7	80 2	S	Cumulo-strati,
17	·722	83.0	83 0	75·9	E	Cumuli,
18 S	·701	93·0	92·1	81·0	S	Cumulo-strati,
19	·690	89·8	88·2	78·0	S	Cloudy Haze,
20	·603	97·8	97·0	79·2	W S W	Cumuli,
21	·639	95·0	94·4	83·0	S	Cumuli,
22	·613	94 9	94·0	85·5	S	Cumulo-strati,
23	·585	98·0	97·0	84 3	"	Cumuli,
24	·604	97·0	96·0	84·2	S	Clear,
25 S	·591	99·0	98·0	85·0	S W	Cumuli,
26	·619	100·5	99·5	80·0	S	Clear,
27	·636	100·1	99·0	81 2	N	Cumuli,
28	·631	98·2	98·5	81·0	W	Cumuli,
29	·641	98·0	97·0	85·8	S	Cumulo-strati,
30	·684	96·9	95·8	84·0	S	Clear,
Mean.	29·703	93·4	92·6	81·0		

Calcutta Meteorological Register continued.

Days of the Month.	Minimum Pressure Observed at 4 P. M.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from 2h 40m to 4 p.m.	
	Inches.	°	°	°		
1	29. ,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	,,	,,
3	29·774	89·5	89·0	79·0	S	Cumuli,
4 S	·798	89·0	88 5	80·0	S	Cloudy,
5	·824	96·5	94·5	75·2	N	Clear,
6	·852	94·5	93·0	79·0	S	Cumuli,
7	·772	95·4	94·3	82·0	S	Cumuli,
8	·716	98·5	97·0	84·0	S W	Clear,
9	·693	92·8	92·0	81·0	S	Clear,
10	·724	88·5	88 9	80·0	S (high)	Cloudy,
11 S	·758	87·8	87·0	80·0	S (high)	Cloudy, Thundering,
12	·808	73·0	71 9	69·0	E	Cloudy,
13	·717	87·3	86·5	80·0	N W	Rain, Thundering,
14	·742	89·0	87·8	77·8	S	Cumulo-strati,
15	·682	79·2	77·0	73·0	S E	Cloudy, Thundering,
16	·636	88·0	87·8	79·0	S	Very Cloudy, Thundering,
17	·702	85 0	83·2	75·0	E	Clear,
18 S	·650	92·2	91·5	79·8	S	Cumuli,
19	·667	88·0	87·8	75 5	S	Cloudy and haze,
20	·580	97·0	95·0	82·8	S	Cumuli,
21	·617	95·2	93·0	83·0	S	Cumuli,
22	·581	94·0	92·9	83·0	,,	Cumuli,
23	·564	97·0	95·2	83·5	,,	Cumuli,
24	·587	97·0	95·1	84 2	S	Clear,
25 S	·566	99·5	98 0	85·0	S	Cumuli,
26	·595	100·5	99·0	80 2	S	Clear,
27	·612	99 8	98·0	77·0	W S W	Cirro-cumuli,
28	·606	99·0	97·8	80·0	S	Cumuli,
29	.616	96·2	95·3	80·9	S	Clear,
30	·670	96·0	94·8	83·0	S	Clear,
Mean.	29·682	92·3	90·1	79·7		

Calcutta Meteorological Register continued.

Days of the Month.	Observations Made at Sun set.					
	Barometer reduced to 32° Fahrenheit.	Temperature.			Wind.	Aspect of the Sky.
		Of the Mercury.	Of the Air.	Of Wet Bulb.	Direction from 4 p. m. to sun set.	
	Inches.	°	°	°		
1	29. „	„	„	„	„	„
2	„	„	„	„	„	„
3	29·777	84·0	84·0	78·0	S	Cloudy,
4 S	·833	85·5	85·5	79·0	S	Cloudy, Thundering,
5	·809	90·8	88 5	76·5	N	Clear,
6	·868	87·5	87·0	79·0	S	Cloudy,
7	·770	89·0	88·0	80·0	S	Generally clear,
8	·718	91·8	91·0	84 0	S	Cirro-cumuli,
9	·701	86·5	86·0	81·0	S	To the W. Cloudy,
10	·737	86 0	86·0	79·0	S E	Cloudy,
11 S	·776	81·5	82·0	78 0	S	Cloudy,
12	·810	71·0	71·0	68·7	E	Cloudy,
13	·762	78·0	77·5	72 5	S W	Cloudy, Thundering,
14	·773	84·0	84·0	75·0	S	Cloudy,
15	·720	78·0	77·0	72·0	S E	Cloudy,
16	·686	72 7	72·5	69·4	S E	Cloudy Thundering,
17	·692	82·0	81 9	76·0	N E	Cirro-strati,
18 S	·645	88 0	87·8	80·5	S	Very Cloudy,
19	·686	84·5	84·8	78·0	S	Cloudy,
20	·634	77·0	77·0	71·0	S E	Drizzly,
21	·634	88·0	87·0	81·0	S	Very Cloudy. Thundering,
22	·583	88·8	88·5	82·0	„	To the W. Cloudy,
23	·573	92 0	91·0	84·0	„	Cloudy,
24	·613	89·2	89·0	82 9	S	Cirro-strati,
25 S	·572	92·9	91·0	83·0	S	Generally Clear,
26	·580	95·5	94·0	79·0	S E	Clear,
27	·609	94·9	93·5	78·5	S	Clear,
28	·630	90·0	90·0	73·5	S	Cirro-strati,
29	·628	90·8	90·0	80·0	S	Clear,
30	·672	89·5	88·8	80·0	S	Generally Clear,
Mean.	29·696	86·0	85·5	77 9		

Calcutta Meteorological Register continued.

Days of the Month.	Maximum and Minimum Thermometer.			Maxim. Therm. in Sun's Rays.	Rain Gauges.		Moon's Phases.
					Elevation.		
	Maximum.	Mean.	Minimum injured.	Maximum injured.	Feet. 40 Upper.	Feet. 4 Lower.	
					Inches.	Inches.	
	°	°	°	°			
1	»	»	»	»	...	...	○
2	»	»	»	»	0·26	0·31	
3	91·0	»	»	»	...	...	
4 S	92·2	»	»	»	...	...	
5	97·2	»	»	»	...	...	
6	96·2	»	»	»	...	...	
7	97·3	»	»	»	...	...	
8	100·2	»	»	»	...	...	☾
9	94·0	»	»	»	...	...	
10	91·5	»	»	»	...	...	
11 S	95·1	»	»	»	...	...	
12	90·5	»	»	»	0·30	0·37	
13	90·7	»	»	»	0·06	0·12	
14	91·8	»	»	»	0·65	0·70	
15	90·2	»	»	»	0·05	0·08	●
16	92·5	»	»	»	0·44	0·50	
17	85·0	»	»	»	...	...	
18 S	93·9	»	»	»	0·12	0·18	
19	90·5	»	»	»	...	...	
20	99·0	»	»	»	0·07	0·12	
21	96·2	»	»	»	...	...	
22	95·8	»	»	»	...	...	☽
23	99·5	»	»	»	...	...	
24	98·4	»	»	»	...	...	
25 S	100·5	»	»	»	3·19	0·26	
26	101·9	»	»	»	...	...	
27	100·5	»	»	»	...	...	
28	100·4	»	»	»	...	...	
29	99·8	»	»	»	...	...	
30	97·9	»	»	»	...	...	○
Mean.	94·3				1·88	2·33	

These Observations having been made for the most part with a supply of new and first rate Instruments, received into the Observatory, by orders of the Bengal Government, a brief description of the Instruments seems necessary.

1st. The Barometer is a standard Instrument by Newman, diameter of the tube 0·504 Inches. The following is the comparative shewing of this Instrument and those Barometers which were in use at the Observatory prior to 1st of June 1844.

Ditto » » » » » » » » » 0·514 ditto.

2nd The Thermometer is a standard Instrument by Newman, on metal Scale and graduated to 1-5th of a degree.

3rd. Wet Bulb Hygrometer by Newman, graduated to single degree divisions, the difference between Standard Thermometer and dry Thermometer of this Instrument is +0·2. The Temperature of the Dry bulb is taken from the Standard Thermometer, and in the event of the quantity moisture, dew point, or dryness, being required, it is necessary the difference adverted to be taken into calculation.

The difference between these instruments, and the Standard Thermometer, is+ 0·7 for the former ,and−.23 for the latter.

The above Instruments are fixed at about 4½ feet from the ground, to a post in a thickly chuppered house, and are freely exposed to the air, and sheltered from any influence of Solar reflection.

On the 23rd and 24th, the Weather Cock was repairing, no observations taken on those days.

Barometer by Troughton, used prior to the 1st of June 1844, Observations reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - - - 29·493

Do. Do. Colonel Everest, used from 1st of June to 31st August 1844, Observations reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - - - 29·637

No. 52. Standard Barometer by Newman, used from 1st of September 1844, reduced to 32° Fahrenheit. - - - - - - - - - - - - - - - - - - 29·654

No. 86, Ditto Ditto Ditto from 3d of April 1847, Ditto Ditto - - - - - - - - - - - - - - - - - - 29·667

H. D. SHUILLIER,
Offg. Deputy Surveyor-General,
In charge Surveyor-General's Office.

No. X.

Extracts from the Log of the Ketch "Ceylon Island."

On 12th April, was within 25 miles of Colombo in Ceylon, when at 7 A. M. the wind became very violent at E.S.E., the sea high, and much rain fell. It was a heavy gale, and obliged the vessel to put back, and accordingly she ran W.N.W.

On the 13th.—At 8 A. M. the wind at S.S.E. abated, and the vessel again stood towards Colombo.

On the 14th.—At 7 A. M. the wind veered by East to South, and the course was shifted to South by East.

On the 15th.—At 4 A. M. the wind was South by East to S.E., very strong with much spray, accompanied by violent gusts of wind and rain, making it difficult to steer the vessel. The sea washing over the sides, no resource was left but to shift the vessel's course again. It blew tremendously.

On the 16th.—Same wind, lost the mizen top-mast, cross-jack yards, and had all the sails blown away. The hold began filling with water at the rate of 14 inches the first half hour, afterwards faster; the pumps were kept constantly going night and day, scudding before it.

On the 17th.—The wind was South, blowing a gale, and the course was west.

On the 18th.—The wind South, and still violent, steering North. Got a sight of the sun. Latitude 9° 14′ North.

On the 19th.—Same gale, S.W. very heavy, the spray considerable, and the sea washing over the sides of the vessel.—Latitude 11° 11′ North.

On the 20th.—A heavy S.W. gale, steering N.W.—Latitude 12° 42′ North.

21st.—Gale moderating at West.—Latitude 14° 19′ West.

22nd. Do. at West.—Latitude 15° 39′ North.

23rd.—Moderate wind at N. W. Latitude 16° 20′ North.

The above extracts are compiled from three or four accounts, differing from one another in important points, but all shewing the vessel being in a gale from 12th to 20th April.

No. XI.

Ship "Buckinghamshire," from London to Bombay.—Captain's Journal.

Sunday, 11*th April*, 1847.—P. M., Light breeze at NNE, and fine clear weather. Departed this life Mariano Francisco. Sun-set, lowered the top-sails to a squall at Northward. A. M., calm. Most of the Chinese, and all the Manilla men, sick of the scurvy: many dead others dying. Invited all of them that were able, to come to Divine service, to implore the great God in whose hands are the issues of life. They came cheerfully, which could not be expected from them under ordinary circumstances.

Latitude observed 5° 17' North, Longitude 67° 50′ East. Barometer 29·92, Sympiesometer 29·91, Thermometer 89.

Monday, 12*th April*.—P. M., Variable light winds, with squalls.

At 2 A. M. a waterspout approached the ship. Barometer 29·88, Symp. 29·82. At 3 A. M., a steady N.N.W. breeze set in and continued to increase. Latitude observed 5° 41′ North, longitude 68° 38′. Gt. Barometer 29·86, Symp. 29·84, Thermometer 86½. Sick—1st Officer, 2 Europeans, 5 Lascars, 11 Chinese, and 13 Manilla-men.

Tuesday, 13*th April*.—Fresh breeze at NNW. At 8 P. M., cloudy with lightning all round. A. M., Fresh breeze at Northward, and cloudy.

Latitude observed, 7° 11' North, Longitude 70° 49′ East, Barometer 29·86, Symp. 29·84, Thermometer 86½. Sick, 1st Officer, 2 Europeans, 5 Lascars, 11 Chinese, and 13 Manilla-men.

Wednesday, 14*th April*.—P. M. Fresh breezes at N. Westward, and fine weather.

Midnight squally, constant rain, much lightning. Barometer 29·86, Symp. 29·86. A. M. Wind at N.N.E. and Northward, with fine weather.

Latitude observed, 8° 18′ North, longitude 72° 56' East. Barometer 29·85 Symp. 29·84, Thermometer 81½. Sick—1st Officer, &c.

Ship Buckinghamshire from London to Bombay.

H.	K.	F.	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. April 15th, 1847.
1	9		N E ¾ E	N W by N	29·72	.....	.....	Strong breeze & cloudy. In Royals 0 | 40 P M, saw the Island of Monicoy from aloft. 1 | 30 Monicoy by SE E by S.
2	8	4	....	.....	29 72	29·74	83	
3	6	4	N E by E ½ E	.....	29 72	29 73	84	
4	5		E N E	Northerly	29·70	29·69	.....	Increased breeze, with a very threatening appearance to the Eastward.
5	5		.....	.....	29·67	29·69	.....	In top gallant sails and bonnet of the rib.
6	5		E by N	N by E	.....	.....	.....	In 1st Reefs.
7	4		.....	.....	29·71	29·71	.....	Heavy squall at Northward, carried away both F. sail-sheets
8	3	4	.....	.....	29·70	29·72	.....	Dismally dark night, with the most vivid lightning.
9	3		.....	.....	29·75	29·76	80½	Fresh gales, hard squalls, and constant heavy rain.
10	2	4	N W by N	N E by Ely	.....	.....	.....	Split the Fore-top-sail, fore-sail, & main-sail.
11	2	4	N N W	.....	.....	.....	.....	
12	2	4	....	.....	29·74	29·75	81	Midnight, fresh gales with constant heavy rain & lightning
1	3		N by W	.....	.....	.....	.....	
2	3		.....	.....	.....	.....	.....	
3	2		.....	.....	.....	.....	.....	
4	2		....	.....	29·67	29 71	80½	
5	3		.....	.....	.....	29·74	.....	
6	3		.....	.....	29·71	.....	.....	Bent the best fore-sail and set it.
7	3		....	....	.....	.....	.....	Fresh gales, severe squalls, & a heavy sea.
8	3		.....	.....	.....	.....	.....	
9	2		N by W ½ W	.....	.....	.....	.....	Passed a Maldiva Boat scudding before the gale.
10	2		.....	.....	.....	.....	.....	
11	2		.....	.....	.....	.....	.....	Fresh gales and cloudy.
12	2		.....	.....	29·67	29·72	81	Latitude observed, 9° 0′ N. long 73° 4′ East.
								Remarks. Friday, 16th April.
1	3		N N W ½ W	N Easterly	.....	.....	.....	Heavy sea at Eastward.
2	3	4	.....	N E by E	29·64	29·72	81	Fresh gales and constant rain.
3	3	4	.....	.....	.....	.....	.....	
4	3	4	.....	.....	29·64	29·71	81	Double reefed main and mizen top-sails.
5	3		.....	.....	.....	.....	.....	Down Royal Yards.
6	3		.....	.....	29·71	29·73	81½	Wore ship.
7	3	4	S E	.....	.....	.....	.....	
8	4		.....	.....	29·72	29·71	81	Heavy head sea.
9	2		.....	.....	.....	.....	.....	
10	2		.....	.....	29·73	29·73	81½	
11	3	4	.....	.....	.....	.....	.....	Fresh gales with severe squalls of rain.
12	3		.....	.....	29·69	29·70	81½	

Ship Buckinghamshire from London to Bombay.

H.	K.	F.	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. Friday, 16th April, 1847.
1	3							
2	2	4			29·58	29·60	80½	Cleared up, and furled fore-sail
3	2	4						
4	1	4	S E by E	N Easterly	29·51	29·55	81	Strong gale and cloudy
5	1	4						Very high sea
6	1	4			29·51	29·54	81	
7	1	4		N E by N		29·61		
8	1	4			29·60	29·63	81	
9	1	4						Noon, hard gale with a very high sea
10	1	4			29·58	29·61	82	
11	1	4						latitude observed, long pr Chro-
12	1	4		N by E	29·53	29·57	81½	nometer 72° 58′ East

Ship Buckinghamshire, off Minicoy, off Cochin, and off Goa, scudding before a Southerly Gale

April, 1847.

								Remarks, Saturday, 17th April.
1	3	4	E S E	N by E				Fresh gales, hard squalls and
2	3	4	E by S ½ S	Northerly				rain, with a very high sea.
3	5	4						Kept away to sight Mini-
4	5	4						coy or to get to the East of
5	6	4	E S E	N by Wly				it before night, having ob-
6	6	4						tained a sight of the sun for longitude, but not for lat.—
								Sun-set, hard gales, heavy
								head sea, and violent squalls
								and rain
7	7	4	E N E	N N W				
8	7	4		N W				Bearing on the longitude of
9	7	4	N E by E	W N W				Minicoy, without seeing it,
10	8							hauled up to E N Eastward,
11	8							Wind changing rapidly to
12	7	4						Westward, but the weather not improving
								Midnight, hard gales, constant
								light rain and lightning to
								Northward
1	8							
2	8			W S W	29·58	29·60	81½	
3	8	4						
4	8	4	N E	S W by S				Squally, with heavy rain
5	8	4	N E by N					
6	8	4						
7	8	4	N N E					
8	9			S S Wly.				Let main-top-gallant-sail over
								the double reefs
9	9		N by E					
10	9	4						Sick, 1st Mate, 2 Europeans,
11	9	4						22 lascars, 11 Chinese, and 14
12	9	4	N ½ E	S by W ½ W				Manilla men.—Fresh gales, and squally. Lat. observed 10° 20′ N, long. 75° 5′ East

Ship Buckinghamshire, off Minicoy, off Cochin, and off Goa, scudding before a Southerly Gale, April, 1847.

H.	K.	F	Courses.	Winds.	Barom.	Sympiesr.	Thermom.	Remarks. Sunday, 18th April, 1847.
1	11	—	N N W	S by W	—	—	—	Strong gales, squalls & rain
2	11	—	—	—	—	—	—	
3	11	—	—	—	—	—	—	Sent the 2d fore-top-sail, and set it double-reefed.—Strong gale and thick weather
4	11	4	—	—	—	—	—	
5	11	4	—	—	—	—	—	
6	11	4	—	—	—	—	—	
7	11	4	N N W ½ W	—	—	—	—	
8	12	—	—	—	—	—	—	
9	12	—	—	—	—	—	—	
10	12	—	—	—	—	—	—	
11	12	—	—	—	—	—	—	
12	12	—	—	—	—	—	—	Midnight, strong gale and cloudy
1	12	—	—	—	—	—	—	
2	12	—	—	—	—	—	—	Strong gale, squally & lightning
3	11	—	—	Southerly	—	29·50	—	In main-top-gallant sail
4	11	—	—	—	—	—	—	
5	11	—	—	—	—	—	—	
6	11	—	—	—	—	—	—	At daylight passed a vessel with loss of topmasts and mizenmast, displaying a British Ensign inverted; she proved afterwards to be the "Mermaid," Rogers, from Bombay. She ran on shore, *sinking*, next day 5 miles below Vingorla.—At 8 A. M. passed an Arab ship with loss of Jibboom, Fore-top Gallant mast, and on starboard tack.—A. M. Threatening weather and all the glasses falling rapidly. Furled the mizen-top-sail; in an attempt to take in the main, kept the ship before it.
7	11	—	N W by N	S S E	—	—	—	
8	11	—	—	—	—	—	—	
9	11	—	—	—	—	—	—	
10	11	—	—	S E by S	—	—	—	
11	11	—	—	—	—	—	—	
12	11	—	—	S Easterly	—	—	—	
		Bar	ometer last mar	ked	28·35	abt th	s time	
it ble	waw	ly. at	noon, the gale be	arg. to an extr	aord	inary d	egree	

Ship Buckinghamshire in a hurricane off Goa, 1847.

Remarks.—Monday, 19th April, 1847.

The gale blowing furiously and veering to the Eastward; cut the fore-sail from the yard and hauled it on deck. The fore top sail blew entirely away. At 0° 30' P. M., the ship inclined to broach to, cut away the mizen mast and kept her before it. Blowing a hurricane, blew away the main top mast, the hurricane increasing and the fore mast bending to its force. About 1 P. M. the foremast fell over starboard: a most furious gust blew away the main mast near the deck. The quarter boats blew away,

the starboard or large cutter flying across the poop. The poop ports having been blown in, the violence of the wind blew down the backheads, destroying the Barometers, and everything in the cabins. The ship covered with spray and labouring excessively in a tremendous sea, the rapidity of her motion tearing everything on the different decks and in the hold adrift. Men unable to stand on their legs, or to hear one another shout. Two o'clock, the wind, which had been for the last half hour indescribably furious, suddenly ceased entirely.

The Simpiesometer in the calm continued to stand at 28·08. The fore and mainmast, which had got under the bottom, were now cut adrift. The ship covered with aquatic birds, thousands of them dying on the deck. About 4 P. M., the wind that had ceased at E.S.E. or East, began to blow with equal fury at W.N.W. The ship was again enveloped with the sea, and labouring with a violence that nothing could resist—3½ feet water in the hold. At 9 P. M., the wind abating, Sympiesometer 28·96. At midnight moderate wind at westward, Sympiesometer 29·1. Daylight, squally at westward. Commenced rigging a jury foremast; Chinese at the pumps. At 9 A. M., saw the Vingorla rocks by NE½E; crew at the pumps. Noon, squally at westward, with showers.

Ship Buckinghamshire dismasted, bearing up for Vingorla.

H. REMARKS.—TUESDAY, 20TH APRIL, 1847.

1.—Set the foretopmast staysail and a foretop gallantsail on the Jury foremast, and bore up for Vingorla.
4.—Westerly breeze and squally. Passing about 2' South of the Vingorla Rocks.
7.—Light breeze and squally with showers. S. Vingorla Rock W. ½ N. At 7·30 anchored with the larboard bower in 9½ fathoms.
10.—Burnt blue lights.
12.—Fresh westerly breezes.
6.—Turned the men out to the pumps.
8.—A vessel with only her foremast standing, and steering by a spar over the stern, running in to the rocks.
11.—Fresh W.S.W. breeze, and fine. The stranger firing guns.
12.—Sent a letter on shore in a water cask.

Ship Buckinghamshire off Vingorla.

H. REMARKS.—WEDNESDAY, 21ST APRIL, 1847.

1.—Moderate Westerly wind and squally.
3.—Moderate W.S.Westerly breeze and cloudy.
(We have been since told that Major-General Morse came down to the beach this afternoon and offered Rs. 200 to any boat that would come off to us; but although the weather was moderate, such was the terror caused by the recent loss of life and property, that there were no volunteers.)
11.—Variable and squally night, heavy rain.
6.—Squally with heavy rain. Filled some casks with rain water, salt water having found its way into the ship's tanks during the hurricane.
10.—Collecting pieces of beef and pork, and other provisions, amongst the coals, the casks having been smashed.
12.—Fresh breeze and squally. Rigging a jury mainmast.

No. XII.

Log of the Ship Faize Rubahny, from Bombay towards China.
Mr. R. Sargent, Commander.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Thursday, April 15th, 1847.
1	5		S E ½ S	.....	.....	P. M. Light Westerly breeze and fine weather. Crew employed as most useful
2	5	4	S E by S	Westerly	.....	
3	5	4	.....	.....	.....	
4	5	4	.....	.....	.....	
5	3	4	.....	.....	.....	
6	5		.....	N W	.....	
7	5		.....	.....	.....	
8	5		....	.....	.....	8h, Moderate breeze and hazy weather
9	8		.....	.....	.....	
10	6		.....	.....	.....	
11	6		.....	.....	.....	
12	4		.....	.....	.....	Midnight, ditto wind and weather
1	3		.....	.....	.....	A M ditto weather
2	1	4	.....	.....	.....	
3			Calm	.....	.....	
4	2		S East,	Variable	.....	4h, Variable, decreasing breeze and hazy weather
5	1	4	.....	.....	.....	
6	2		.....	.....	.....	P S at 14 inches
7	1	4	S E by S	....	.....	Daylight, variable air and calms
8			.....	....	.....	A confused sea. Carried away the Starboard Fore-Lift, shifted the main-top gallant sail to repair
9			.....	....	.....	
10			.....	....	.....	
11			.....	.....	.....	Latitude observed, 12° 18′
12			.....	.....	.....	Longitude Chron 75° 20′ about
						Remarks. Friday, April 16th, 1847.
1	1	4	S S W .	S E by S	.....	P M, Strong breeze with hazy weather, with a high sea
2	4		.....	.....	.....	
3	4		.....	.....	.....	
4	4		South ..	.....	.....	At 4, increasing breeze. In a heavy scud against a high sea, pitched away the fore-top-gallant-mast, and sprung the main-mast about 3 feet above the rigging. At 6h, took in the main-top-gallant-sail. 6h 30, increasing to a gale. Hauled the main-sail up and stowed the jib. 8h, in taking a reef in the fore-top-sail carried away the sheet and split the sail, furl'd it
5	2	4	.....	.....	.....	
6	2	4	.....	.....	.....	
7	2		.....	....	.....	
8	2		S S W	.....	.....	
9	2		.....	.....	.....	
10	2		.....	.....	.....	
11	3		.....	.....	.....	
12	3		.....	Vble to S E	.....	Midnight, strong breeze with a very high sea. In st reef the main-top-sail, and close reefed the mizen-top-sail, and furl'd it.
1	4		South	Hzy. Shry.	.....	
2	4		....	.....	.....	
3	4		....	....	.....	

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Friday, April 16th, 1847.
4	4		... ...	... ...	...	
5	3		S by E	.. ...	...	
6	3		... ...	... ...	...	Day light, moderate gale, pitched away the flying jibboom, unbent the fore-top-sail to repair
7	2		... ...	... ...	...	
8	2		... ...	... ...	...	
9	2		... ...	... ...	...	
10	2		N E by N	... ...	...	Wore ship to the Northward
11	2		... ...	... ...	...	Noon do wind and weather
12	2		... .	... ...	...	Latitude observed, 11° 19′ 0″ North Longitude Chron. 75° 34′ 0″
						Remarks. Saturday, 17th April.
1	2		N E by N	E S E	...	P. M. Strong gale with a high sea, ship pitching very deep at times, taking a great quantity of water on deck
2	2		... ...	... ...	...	
3	2		... ...	... ...	...	
4	2		... ...	... ...	...	At 4 wore ship to Southward
5	3		South	... ...	...	
6	3		... ...	... ...	...	At 6 bent the fore top-sail, and set it reef'd
7	3	4	S S E	Varble to E	...	
8	3	4	S E by S	... ...	...	8h, increasing gale with rain
9	2		S S E	E	...	
10	2		... ...	... ...	...	Midnight, a hard gale with a high head sea; took in the main-sail, ship pitching and labouring very heavy, and taking great quantity of water on deck. P. S. every hour at 14 inches
11	2		... .	... ...	...	
12	2		... ...	... ...	...	
1	2	4	S S W	Vble to S E	...	At 4 reef'd the fore-top-sail and furl'd the mizen
2	2	4	... ...	... ...	...	At daylight a very heavy gale with a tremendous sea struck the vessel,
3	2		... ...	... ...	...	wash'd away the lee quarter boat, and strained the ship greatly fore and aft
4	2		... ...	... ...	...	At 6h 30, found the ship making a greater quantity of water than
5	2		... ...	... ...	...	usual, found 2 feet of water in her well At 7h 30, the water gained
6	2		... ...	... ...	...	on both pumps, the injury sustained from the heavy weather, deemed it necessary for the preservation
7	2		N N W	... ...	...	of ship and cargo, to bear up before the wind, and to lighten the
8	6	4	... ...	... ...	...	ship. Threw 18 bales of cotton over board, and clear'd the decks
9	6	4	... ...	... ...	...	of all spare spars, new rope, &c, &c. At 8h 30, ship shipping a
10	6	4	... ...	... ...	...	heavy sea, which laid her leading blocks under water, ship occasionally motionless. Cut away the main-
11	6	4	... ...	... ...	...	top-sail and mizen-sail from the yards, not being able to take them in: ship making 30 inches of water per hour, both pumps constantly going

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Saturday, April 17th, 1847.
12	6	4	... ...	... ...	...	Noon, blowing a very hard gale with tremendous heavy squalls of wind and rain. A very high sea running, occasionally burying the ship fore and aft. Pumps constantly going. No observation
						Remarks. Sunday, April 18th, 1847.
1	6	4	North	S E S	...	P. M. Commencing with a very heavy
2	6	4	... ...	... ...	...	gale and violent squalls of wind and
3	6	4	... ...	... ...	...	rain, tremendous sea running All hands employed at the pumps, making 30 inches per hour
4	6	4	... ...	... ...	...	Midnight do wind and weather
5	6		... ...	... ...	...	All hands employed at the pumps,
6	6		... ...	... ...	...	constantly going, 30 inches water in the well. At 3 A. M. not being
7	6		... ...	... ...	...	able to steer the ship, broached to to port, taking the head yards back, a tremendous heavy sea
8	6		N N W	S E	...	striking her counter and carried away the tiller chains, upper brace, and the two lower gudgins or
9	6		... ...	... ...	...	pintles, the rudder apparently hanging by the upper pintle and
10	6		... ...	... ...	...	gudgin. Lashed the helm to starboard and got a lashing on the rudder head to stern port, not
11	6		... ...	... ...	...	being able for want of strength to get the head yards braced round
12	6		... ...	... ...	...	and filled upon, the crew being exhausted at the pumps. The sea struck heavily against her counter
1	6		... ...	... ...	...	frame, and caused her to strain fore and aft
2	6		... ...	... ...	...	6h, A ship passed us standing to the NW; showed a signal of distress,
3	6		... ...	... ...	...	the Ensign Union down, of which she took no notice. Lashed the helm to port and the head yards filling,
4	6		... ...	... ...	...	got her before the wind and brought to on the starboard tack, and the wind about the beam, in
5	5	4	... ...	... ...	...	wearing the fore-top-sail blew out of the bolt rope, pitched away the jibboom and the starboard quarter
6	5	4	... ...	Wore ship	...	boat, filling from a heavy sea, breaking over the poop, carried away the davits and lost the boat
7	1		East	... ...	...	also, washed the long boat out of the chocks into the lee waste and
8	1		... ...	... ...	...	stove her, secured her to the lee rail
9	1		... ...		...	
10	1		... ...		...	Noon, blowing excessively hard with heavy squalls of wind. All hands
11	1		... ...		...	employed at the pumps, 30 inches
12	1		... ...		...	of water throughout the 24 hours.
				Noon, no observn.	...	
					...	
					...	

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Monday, April 19th, 1847.
1	1		East	South	...	P. M. commences with do wind and weather
2	1		... ...	... ...	...	At 3 washed away part of the lee quarter gallery
3	1		... ...	... ...	...	
4	1		... ...	... ...	...	
5	1		... ...	... ...	...	Sun set do wind and weather, all hands at the pumps
6	1		... ...	... ...	...	
7	1		... ...	... ..	...	Midnight, light wind and seas; sounded in 30 fathoms
8	1		... ...	... ...	...	
9	1		... ...	... ...	...	Day light, made the land between Cape Ramos and St George's Island.
10	1		... ...	... ...	...	At 6 anchored in 8 fathoms water, with feet of water in the hold, to
11	1		... ...	... ...	...	repair damages, to enable us to get
12	1		... ...	... ...	...	to Bombay
1	1		... ...	... ...	...	
2	1		... ...	... ...	...	Noon, decreasing breeze with cloudy weather. Cape Mayon NN W½W
3	1		... ...	... ...	...	
4	1		... ...	... ...	...	Cape Ramos south and by east
5	1		... ...	... ...	...	St George's Island N W
6	1		... ...	... ...	...	Pump'd the ship out dry, making 10 inches of water per hour at anchor
						Latitude observed, 15° 19′ North.
						Remarks. Tuesday, April 20th, 1847.
1			... ...	... ...	...	P. M. Crew employed at the pumps
2			... ...	S W	...	
3			... ...	... ...	...	
4			... ...	... ...	...	
5			... ...	... ...	...	
6			... ...	... ...	...	4h, Moderate gale with heavy squalls of wind and rain; carpenters employed fitting a top mast cap for rudder, brace on the stern port, seacunnies repairing sail for bending
7			... ...	... ...	...	
8			... ...	... ...	...	
9			... ...	... ...	...	
10			... ...	... ...	...	
11			... ...	... ...	...	
12			... ...	... ...	...	
1			... .	S W	...	
2			... ...	... ...	...	Midnight, do weather
3			... ...	... ...	...	A. M. do weather
4			... ...	... ...	...	
5			... ...	... ...	...	
6			... ...	... ...	...	
7			... ...	... ...	...	
8			... ...	... ...	...	Noon, strong breezes with heavy passing squalls of wind and rain
9			... ...	... ...	...	
10			... ...	... ...	...	
11			... ...	S W	...	P. S. every 2 hours throughout the 24, at 1 foot per hour
12			... ...	... ...	...	

Log of the Ship Faize Rubahny continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks. Wednesday, April 21st, 1847.
1			... ...	... ...	...	P. M. Crew employed repairing damages
2			... ...	S W	...	
3			... ...	... ...	...	Carpenters employed at the rudder
4			... ...	... ...	...	Seacunnies repairing sail for bending
5			... ...	... ...	...	
6			... ...	... ...	...	
7			... ...	... ...	...	
8			... ...	S W	...	Midnight, strong breezes with heavy
9			... ...	... ...	...	passing squalls of wind and rain
10			... ...	... ...	...	
11			... ...	... ...	...	
12			... ...	... ...	...	
1			... ...	... ...	...	
2			... ...	... ...	...	Daylight, do wind and weather
3			... ...	... ...	...	
4			... ...	... ...	...	
5			... ...	S W	...	9h, bent the fore-sail and main-top-
6			... ...	... ...	...	sail in 2d reef and furled it
7			... ...	... ...	...	
8			... ...	... ...	...	
9			... ...	... ...	...	
10			... ...	.. ...	...	Noon, moderate breeze and hazy
11			... ...	... ...	...	weather, Pump ship as yesterday.
12			... ...	... ...	...	

No. XIII.

Extracts from the Log of the late Ship Mermaid.

H.	K	F.	Courses.	Winds.	Lee Way	Remarks &c.—Saturday, 17th April, 1847.
1	3		S E by S	S S W	..	P. M., Light increasing sea breeze and fine, Barometer 29·48
2	3	4	S E	....	..	
3	3	4	.....	.....	..	5h P. M. Mangalore flagstaff East 7 miles
4	3	4	.....	.....	..	
5	3		S E by E ½ E	.....	..	Sunset tacked to the Southward and Westward in 15 fathoms
6	2	4	W S W	South	..	Cloudy over the land
7	2		....	.....	..	At 8h, moderate land wind and hazy
8	4	4	S W	S S E	..	
9	5		....	.....	..	At 10 sounded in 19 fathoms, increasing breeze and
10	5	4	S S W	S E	..	hazy
11	6		.....	.....	..	Midnight, fresh breeze and cloudy; in top-gallant-
12	6	4	S by E	S E by E	..	sails, sounded in 22 fathoms, Barometer 29·46
1	7		.....	.....	..	A. M Fresh breeze and cloudy with rain at times.
2	7		....	.....	1	in 2nd reefs, in one
3	6		.....	.....	1	At 5h 30 Mount Dilly ENE, about 20 miles
4	5		.....	.....	1½	Daylight, increasing breeze and squally
5	5		.....	.....	1½	In mainsail, jib, and spanker
6	5		South	E S E	2	Barometer 29·46. A fresh breeze with violent squalls at times, close reefed the top-sail. At 10h, Barometer 29·40. In fore-sail and fore-top-sail and laid the ship too under close reefed main and mizen-top-sails, and mizen-stay-sails. Breeze in-
7	5		....	....	2	

Log of the late Ship Mermaid continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks &c. Saturday, 17th April, 1847.
8	5				..	creasing to a regular gale, 2 feet 6 inches in the hold, both pumps kept going. At 11h, heavy gale with tremendous sea running, ship labouring and
9	4				..	pitching heavily. 11 30 all 3 bobstays carried away, secured the bow-sprit with end of the
10	2		S S W		..	messenger sent up to the capstern through the hawsehole. At 11 45, carried away flying jib-boom, fore and main-top-mast, and mizen-top-gallant-mast. Barometer 29·35. Noon, severe
11	2				..	gale and cloudy, Sun obscured, no observation, Soundings 50 fathoms.
12	1	4			..	Latitude ascertained, 11 .38 North
						Remarks &c. Sunday, 18th April, 1847.
1	...	4	off W S W	S E	4	P. M. Continued heavy gale and a heavy sea running; both pumps kept going, without diminishing the water. Barometer 29 36. People clearing away the wreck, the quarter boats and gig fill and carried away the davits. At 2 30, Mizen-stay carried away, and sprung the mast severely, fitted a preventer stay, 3 feet 6 inches in the hold. At 4 30, found it necessary to cut away the mizen-mast, as it worked the poop very much, and enabled the ship to be kept away. At 5h, finding it impossible to make any progress to the southward, determined on putting back for Bombay. At 5h, set a sail on the fore-mast and bore away. Well, 4. 6, Barometer 29·40. Midnight increasing gale, with heavy rain, lightning and thunder. 4h A. M., more moderate, Barometer 29·47, both pumps kept constantly going. Daylight, saw a ship going the same way, under close reefs; hoisted signal of distress but she took no notice
2	...	4	on S S W		4	
3	...	4			4	
4	...	4			4	
5	...	4			4	
6	5	4	N W	South	..	
7	6				..	
8	6				..	
9	6				..	
10	6				..	
11	6				.	
12	7				..	
1	7				.	
2	7				..	
3	7	4		S S W	..	
4	7	4			..	
5	7	4			..	
6	7	4			..	
7	7	4		S W	..	
8	7	4			..	
9	7	4			..	
10	7	4	N by W	West	...	
11	7	4			..	Noon steady gale and cloudy, with a heavy sea on; ship labouring and rolling heavily, 5 feet water in the hold, all hands at the pumps. Sun obscured, no observation
12	7	4		W S W	..	Latitude ascertained 13·52 North. Soundings, 35 fathoms, Barometer 29·50
						Remarks &c. Monday, 19th April, 1847.
1	7	4	N N W	W S W	5·8	P. M. Steady gale with heavy sea, both pumps constantly going, crew much exhausted, Bar. 29·50
2	7	4			..	
3	7	4			..	
4	7				..	
5	7				..	Sunset, passed a large ship, hove to on the starboard tack
6	6	4	N by W	West	..	
7	6				6 ft.	Sounded in 30 fathoms
8	6				..	At 8h, gale more moderate, with severe squalls at times, accompanied with lightning, thunder and rain
9	6				..	
10	6		North		..	
11	5				..	
12	3				7 ft	didnight, do. weather. Barometer 29·51, Sounded 27 fathoms
1	4	4	N by E	W N W	...	A. M. do weather
2	4	4			..	
3	4				by W	At 4h, decreasing breeze with severe squalls at times
4	5				3	
5	5				...	Daylight, do weather. Extremes of land NE to
6	5				..	SE by E, distance about 15 miles

Log of the late Ship Mermaid continued.

H.	K.	F.	Courses.	Winds.	Lee Way.	Remarks &c. Monday, 19th April, 1847.
7	5		.....	.....	..	At 9h A. M., the wind hauling round to the Northward and Westward, and the ship making much lee way, bore away for anchorage. At 10, came to, with the best bower in 7 fathoms, and veered out to 70 fathoms, ship riding easily. At 11 30, 8 feet 6 inches in the hold, and after half an hour's close attention, found the ship making at the rate of 3 feet an hour, and apparently settling fast; upon which determined (for the safety of the crew and cargo) to beach the ship; consequently slipped the cable and run for the shore. At 12 30, ship grounded, bumped heavily, and came broadside on at Machemar (fishing village,) 5 miles south of Vingorla.
8	5		.....	.....	3½	
9	5		N E	N W	..	
10			.....	.....	..	
11			.....	.....	..	
12			.....	.....	..	

No. XIV.

Information collected at the Master Attendant's Office, Bombay, by Norman Oliver, Esq.

Bombay, 28th April, 1847.

Sumsoodeen, a Lascar of the Pattamar Alowboody, from Tellicherry bound to Bombay, states that we left Tellicherry 15 days ago, or on the 14th instant, and when near Goa 3 days after, we experienced a very strong gale of wind with little rain. We put off for 3 days and nights, but the gale was still increasing and continued so for 7 days. When the wind commenced to abate we turned and made for shore, and arrived safe in Razapoor River. We threw overboard part of our cargo, consisting of pepper, sandalwood, cocoanuts, &c. We saw no Pattamar or any large vessel, but several articles, such as cocoanuts, firewood, cotton bundles, &c., were seen floating. We remained two days in the Razapoor River, but heard no account of the gale as we were anchored at a place where there was no other vessel. The *wind was first blowing from the land side, and afterwards from the opposite direction.*

Doonva, a Lascar of the Pattamar Nubbeebux, arrived yesterday from Barcole. States we left Barcole on or about the 15th instant, and experienced a heavy gale when near Malwan, we therefore put off and remained so for 3 days. During this time the wind blowing very hard from the land side and the sea running very high. We threw overboard a quantity of stores which we had on board for Bombay. After 3 days the wind moderated, and we were three days more in coming towards the land. We came near Jaitapoor, when the weather became fine. We saw several articles floating, but no dead body, or any vessel in distress.

Madoo, a Lascar of the Pattamar Sacry Sallamity, arrived yesterday from Coomta, states that we left Coomta about 12 days ago; three days after we came near Razapoor, where we met a very strong gale from the land side; we put the

vessel outside for three days, when the wind changed and blew from the opposite direction; we were three days making the land, and arrived at Jaigur when the gale was entirely over. We received no injury to the vessel, but were obliged to throw over board a quantity of cotton in bundles, which we had shipped from Coonta. We saw several articles floating on the sea, but no human body.

The 29th April, 1847.

SHAICK ADAM, Tindel of the Pattamar Labsavoy from Ponany, arrived at Bombay last night. States that we left Ponany on the 2nd of this month, and arrived near Jaigad river on the 17th. On the following day it commenced blowing hard from the East, and in the middle of the day the wind blew in a heavy gale with a tremendous sea, and at 5 P. M. the wind shifted to SE with heavy rain. We were at anchor at this time near the river, and when the wind shifted to the S.E. we put in the river, where we remained 4 days. Whilst at anchor outside the river, we saw a Pattamar swamped at some distance from us, and on account of the heavy sea we were obliged to throw overboard a number of cocoanuts, and happily we received no injury to the vessel or to any one on board her, but a small boat which was secured on board was carried away during the gale and recovered next day by the people on shore, who restored it to us, but a part of the stern broken.

The 3rd May, 1847.

TENDAL TANNA, of the Pattamar Hunmuntpersad, from Tellicherry, arrived at Bombay on the evening of the 1st instant, states that he left Tellicherry about a month ago, and experienced a very heavy gale of wind when near Rutnagherry on or about the 18th of last month; the gale commenced blowing first from the East and shifted to the west two days after. We put off to sea and came to Rutnagherry 7 days after, when the gale had moderated. We threw over board sandalwood, pepper, and various other articles, and on our arrival at Rutnagherry we were amazed to see the extensive destruction of houses and trees which the gale had blown away and totally uprooted. We met no dead bodies, and saw no wrecks whatever. We had two sails torn in the gale, which we repaired at Rutnagherry.

NOOROODEEN, a Lascar of the Pattamar Towcully from Allepy, arrived at Bombay on the 1st instant, evening, states that the vessel left Allepy on the 9th or 10th of last month, and experienced a heavy gale on the night of the 17th when near Dewgur. It commenced from the east, and on Sunday morning we put in the Razapoor River, where we remained until the wind had moderated, which was on Wednesday the 24th. We suffered no injury to the vessel, and saw nothing.

The 12th May, 1847.

AHMED, Syrang of the Bugla Salmy, wrecked off Goa in the late gale, states that the Bugla Salmy, Nacodah Abdul Latib, bound from Mangalore to Muscat,

left the former port about a month ago, with a cargo of rice, &c., and 3 days after experienced a very heavy gale at night near Goa; she cast two heavy anchors in 12 fathoms of water. The wind blowing exceedingly strong from the landside Eastward. At 4 A. M., the Nacoda observed the vessel in a leaky state, and when the leak increased to about waist deep, he ordered to throw overboard a quantity of cargo, and before about 400 robins were thrown overboard the vessel sunk down, which was about the break of day. The crew, consisting in all of 125 persons, all perished except 22 men, some of whom sat on water tanks, some took hold of pieces of wood and were in sea for 3 days, when the wind shifted to SW, and the men were drifted on shore to the south of Vingorla.

No. XV.

Extract from the Log Book of the Bombay Steam Navigation Company's Steamer Victoria, during her passage from Bombay to Colombo. (civil time.)

H.	K.	F.	Courses.	Winds.	Remarks. Friday, 16th April, 1847.
1	5	4	S S E	Easterly	A M fresh breezes and fine weather
2	5	4			
3	5	4			3,45 Mangalore Light bore east
4	5	4			5,30 Mangalore flagstaff bore N by E and Barn Hill E by S
5	5	4			A heavy ground swell setting to the west; crew washing decks &c.
6	5	4			
7	5	4			
8	5	4		S S E	Set all possible sail, crew variously employed
9	5	4			
10	5	4			
11	5	4			In 'all sails. A heavy swell at Northward. Noon fresh southerly winds and cloudy weather. Bearing at noon Barn Hills N by W, and mount Dilly S E by S
12	5	4		Southerly	A heavy swell and cloudy weather. Lat. observed 12°15′ N
1	4	4	S S E	S Easterly	P M fresh S Easterly wind and cloudy weather
2	4	4			
3	4	4			
4	4	4			
5	4	4			
6	3		S E ½ E	Fresh	E S E winds and cloudy weather with drizzling rain
7	3				
8	3		S E		Mount Dilly bore N N W
9	3				Cannanore light S E by E ½ E
10	3				Anchored off Cannanore in 4½ fathoms water and veered chain to 30 fathoms on the best bower
11					Heavy swell, ship rolling tremendously.
12					A boat came from the shore but would not take any thing on shore, likewise refused to take the mail; surf increasing considerably with continued rain from the S. Easterly. Remarks running into Cannanore—Running into anchorage about 9 P M, the light bearing about S E by E, the man in the chain giving 4½ faths, the vessel received a sudden shock, but proceeded on; sounded the wells, but found she made no water.
					Remarks. Saturday, 17th April, 1847.
1					A M, Increasing surf, squally weather, wind about E S E.
2					At 2 found the vessel labouring so heavy got the steam up and the chain unshackled at 45 faths. ready to ship.
3					

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks &c.—Saturday, 17th April, 1847.
4					with a buoy to it, and the surf was making a clean breach over her, taking with it the whole of the bulwarks from the starboard side, filling the gig, washing oars out of her, bending the davits, and carried away the side ladders; ship labouring and rolling tremendously, the large rollers striking her with great fury, and a great deal of water going down the hatchways. Crew constantly at the pumps.—6. The Steamer *Hugh Lindsay* got under weigh, and stood out through the rollers, pitching and rolling awfully.—6, 30. Finding the rollers to be coming in with more force, making clean breaches over her, and washing everything overboard with it, deemed it prudent to stand out to sea for the safety of all on board: accordingly slipped from the anchor, set all sail, and stood through the surf; pitching and rolling a great deal. Stood out SSW till 9 A.M. In all sail, and sent the yards, mizen-top-mast and fore-top-mast gallant-mast down on deck. Strong gales, with a heavy sea and showers of rain. Ship labouring very heavy, carrying away more of the bulwarks, head bulwarks, and quarters. The *Hugh Lindsay* in company—split the fore-top-mast stay-sail. Noon, Gale increasing and ship rolling and pitching, thought it prudent for the safety of all on board, to throw overboard the heavy pieces of iron work belonging to the cranes on freight: accordingly set all hands to work, and threw 9 pieces of them overboard, and found the vessel to lay too much easier; crew constantly at the pumps throughout.—2 P.M. Heavy gusts of wind and heavy rain; split the mainsail in rags, and carried away the jaws of the gaff; got the storm mizen up, and bent it to the gaff, and lashed the gaff to the mast and set the sail; ship still labouring very heavy and making about 5 inches of water per hour, and the engines working very slow—about 5 revolutions per minute. A great deal of water coming through the waste water pipes, heading WSW off West; wind SSW.—8. Heavy gales, attended with heavy southerly squalls and heavy rain; crew constantly at the pumps, with all servants assisting. Ship giving heavy lurches, started the paddle box, easing the engines, making about 5 revolutions per minute.—10 P.M. Lost sight of the *Hugh Lindsay* light, ship labouring awfully, the seas striking with great violence under the sponson, and staving the after paddle box cabins.—Midnight. Strong gale and tremendous sea, ship labouring heavy throughout, pumps constantly going. During the time of the roller breaking over the vessel, one of the cabin ports was dashed in and filled the cabin with water, washing overboard one of the skylights belonging to the ladies' cabins, hencoops, three sheep, two pigs, and a quantity of chairs off the poop.
5					
6					
7					
8					
9					
10					
11					
12					
	Battened all the Hatches down.				
				Winds	E S E.
				Bar.	29·75
				Bar.	29. 70

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks &c.—Sunday, 18th April, 1847.
1	Engines going very slow throughout, making from 5 to 6 revolutions per minute.		Up S S W	Southerly	Strong gales attended with heavy rain and squalls, ship
2			..	..	labouring heavy throughout. Crew constantly at the
3			Off	..	pumps, ship making about 5 inches per hour. Threw
4			Southerly	..	four cases of mango plants overboard, to the south
5			..	Bar. 29·70	eastward, and set the fore-try-sails; crew constantly
6			To	..	at the pumps; wind moderating a great deal, but at-
7			..	Wore ship	tended with constant squalls and heavy rain.
8			W S W	..	
9			Up S E	..	
10			..	..	
11			Off South	..	
12			..	Bar. 29·90	Noon. Fresh breezes and thick cloudy southerly wea-
1	...	..	S E	..	ther, attended with constant heavy squalls and heavy
2	...	..	S S E	..	rain. Ship labouring heavy, crew constantly at the
3	...	...	..	..	pumps throughout.—P. M., heavy squalls from the
4	...	...	W S W	..	southward, attended with heavy rain; ship making
					about 5 inches per hour.—1. 30. Wore ship, a heavy
					sea still running.
5	Up	...	S W by S	..	3 30. Barn hill bore N E ½ E, and southern extremes
6	off	...	S W ½ W	..	of the land S E by E.
7	...	...	..	..	8. 30. Requiring to stand to the eastward, tried to bring
8	...	...	..	..	the ship's head to the wind, but finding the engines
9	1	4	S E	..	would scarcely move, set the stay-sail and wore
10	1	4	...	...	making about ship and set fore-top-sail.—Midnight.
11	1	4	5 Points Leeway	..	Heavy squalls and hard rain throughout; swell in-
12	1	4	...	Southerly	creasing, and ship labouring very heavy; pumps con-
					stantly going.
					Remarks, &c.—Monday, 19th April, 1847.
1	..	...	S E by S	Southerly	A. M. Hard squalls attended with heavy rain.—1. 45.
2	...	..	..	..	Sounded in 15 fathoms, tacked ship to the westward.
3	...	..	S S E	..	—6 Wore ship to the southward, thick.
4	...	..	...	..	The Engineers reported that the slide rods were bent
5	...	..	W S W	..	and side rods strained, and framing strained badly,
6	...	..	..	..	in consequence of the heavy weather.—Daylight. Got
7	..	..	S E by E	Southerly	the spare best bower out of the after hold, put it over
					the bows and bent the chain to it.
8	..	..	..	..	3. Mangalore flagstaff bore S E by E, crew getting all the
9	...	..	..	..	coals out of the holds, short of coals.—11. Found the
10	...	..	...	...	engines were not making more than 6 revolutions per
11	...	..	..	..	minute, and her head falling off in shore. Let go the
12	..	...	..	..	best bower anchor in 6 fathoms water, and veered
1	...	..	..	..	chain to 35 fathoms, with Mangalore flagstaff bearing
					S E by E.—Noon. Hard squalls and heavy rain; swell
					decreased considerably on anchoring from a strong
					set to the northward. Engineers overhauling the
2	...	..	..	..	engines &c.
3	...	..	...	..	
4	...	.	..	Southerly	Hard southerly squalls and heavy rain throughout;
5	...	..	..	..	crew getting coals out of the fore holds, and pump-
6	...	..	..	..	ing ship every four hours at 4 and 5 inches.
7	...	..	..	..	
8	...	..	..	..	
9	...	..	..	Southy. W	Set the watch.
10	..	..	..	..	
11	..	..	..	..	Midnight. Strong southerly squalls and heavy rain, and
12	..	..	..	..	a heavy ground swell throughout.
					Remarks, &c.—Tuesday, 20th April, 1847.
1	..	..	..	S by W	A. M. Strong southerly squalls and heavy rain through-
2	..	..	..	..	out, a heavy ground swell setting in, ship labouring
3	..	..	..	..	heavy.
4	..	..	..	..	
5	..	...	..	..	
6	..	..	..	..	Daylight. Crew employed getting all the coals up,

Log of the Steamer Victoria continued.

H.	K.	F.	Courses.	Winds.	Remarks, &c.—Tuesday, 20th April, 1847.
7	..	..	..	..	sweeping the holds, and putting them in the bunkers.
8	..	..	...	..	Sent down the fore gaff and sail, and bent it to the
9	..	..	..	..	main-mast for mainsail. Pumping ship every four
10	..	..	..	..	hours at 5 inches.
11	..	..	..	..	Noon. Fresh W S W squalls and heavy rain, and veering
12	...	..	...	..	round to the north westward with cabins.
					After repeated signals to the shore, and finding no
					boat coming off to us, determined to run down to
1	..	..	..	..	Cannanore.—P. M. Fresh southerly squalls and
2	..	..	S ¼ E	..	hazy weather.—2 Up anchor and proceeded down the
3	6	...	..	..	coast, and found the engines to work very well, 16
4	6	..	..	..	revolutions —2 50. Mangalore flagstaff bore East.
5	6	..	S by E	..	Sent yard up and set sail to advantage.—6. 15. Barn hill
6	6	..	..	Southerly	bore N E by E. Mount Formosa, S E.
7	6	..	..	..	
8	6	..	S by E ½ E	..	
9	6	..	..	..	Engines' bilge pumps keeping her free.
10	6	...	..	..	Engines making 18 revolutions.
11	6	..	S S E	...	
12	6	..	..	..	Midnight. Light southerly squalls and drizzling rain.
					A strong current setting to the northward.
					Remarks, &c.—Wednesday, 21st April, 1847.
1	6	..	S E by S	Southerly	A. M. Light southerly squalls and drizzling rain. In
2	6	..	..	..	all sail.—2.30. Passed a large steamer at anchor. Mount
3	6	..	S E	..	Dilly bore S E about 6 miles.
4	6	..	..	..	
5	6	...	S E by S ½ S	..	3. Mount Dilly bore east. A strong current setting
6	6	...	East	...	at westward.
7	6	...	E S E	...	
8	6	..	..	..	8. Anchored off Cannanore with the best bower in 4½
9	..	...	..	..	faths. water. Flagstaff bore N E W. Commenced
10	..	..	..	..	taking in coals and discharging cargo.
11	..	..	..	..	
12	..	..	..	..	

No. XVI.

Ship Atiet Rohoman, from Mauritius, lying at Aleppee—S. Stewart, Commander,—1847.

H.	K.	F.	Courses.	Winds.	P. W.	Remarks, &c.—Thursday, 15th April, 1847.
1	..	..	Steering in for Aleppee	N W	...	P. M.
2	..	..		S W	...	Moderate breezes and fine.
3	..	..		Variable	...	Steering in for Aleppee.
4	..	..		E by S	18	
5	..	..		...	...	5. Came too with best bower in 6½ fathoms water,
6	..	..		...	...	veered to 35 fathoms cable in hawse, flagstaff
7	...	..		...	...	bearing E by S, about 3 miles off shore. Furled
8	...	..		E S E	18	sails and cleared up the decks.
9	...	..	..	...	...	
10	..	..	..	...	...	
11	..	..	..	...	...	
12	..	..	..	...	18	Midnight. Cloudy.
1	..	..	...	S E	...	A. M.
2	..	..	...	...	...	2. Heavy squalls from S S E.
3	..	..	..	S S E	...	Veered away cable to 75 fathoms before bitts.
4	..	...	...	...	18	
5	..	..		...	...	
6	..	..		...	...	Daylight, moderate and cloudy.
7	..	..		...	...	
8	...	..	At anchor	Easterly	18	8, Cloudy with rain. Pumped ship.
9	..	..		...	...	Employed getting all ready for discharing copper
10	..	...		...	...	and hoisting in water, also taking turns out of
11	..	...		...	...	larboard cable and coiling it away clear. At noon
12	...	...	...	N E by E	16	moderate breezes and cloudy, with drizzling rain.

Log of the Ship Atiet Rohoman continued.

H.	Winds.	P. W.	Remarks &c.—Friday, April 16th, 1847.
2	N E by E	..	P. M., Moderate breezes and cloudy, with drizzling rain.
4	E N E	16	
6	East	..	Sunset, do wind and weather.
8	..	16	Down royal yards.
10	E S E	..	
12	S E	16	Midnight, dark cloudy weather, with rain.
2	S S E	..	A. M.
4	S E	17	Cloudy with rain. At 8, crossed royal yards, people employed cleaning
6	E S E	...	paint works outside and variously; seacunnies and carpenters
8	East	17	as requisite.
10	..	...	
12	E N E	17	Noon, cloudy with constant rain.
			Remarks &c.—Saturday, April 17th, 1847.
2	East	..	P. M., increasing breezes, with rain.
4	E S E	17	
6	..	..	Sunset, strong breezes, sent down royal yards and rove top-gal-
8	S E	17	lant yard ropes.
10	..	..	
12	E S E	18	Midnight, heavy squalls, accompanied with heavy rain &c.
2	...	..	A. M.
4	..	18	Ditto wind and weather.
6	S E	..	
8	S S E	18	Ditto wind and weather.
10	..	..	
12	South	18	Noon, strong breezes and cloudy, with a heavy swell on.
			Remarks &c.—Sunday, April 18th, 1847.
2	S by E	...	P. M., Strong gale and rain, with a heavy sea on,—pumped ship.
4	S S E	18	
6	..	...	Sunset, sent down top gallant yards and rove top gallant mast
8	S E by S	16	ropes.
10	..	..	Midnight, heavy gusts of wind and rain, with the same sea.
12	S E	16	
2	...	..	A. M.
4	S E by S	16	Daylight, more moderate and less sea on; hove in to 45 fathoms of
6	..	..	bitts.
8	S S E	16	
10	..	..	
12	S by E	16	Noon, dirty squally weather, with rain, and sea increasing.
			Remarks &c.—Monday, April 19th, 1847.
2	S by E	...	P. M., Moderating but squally at times, with rain.
4	..	17	
6	South	..	Sunset, Do wind and weather.
8	..	17	
10	..	..	
12	S S E	17	Midnight, Do wind and weather.
2	..	..	A. M.
4	S E by S	17	Daylight, hove shore to 15 fathoms, 8, Crossed top gallant and
6	..	..	royal yards.—10, made sail and weighed, to work ship farther in
8	S E	17	shore.
10	..	..	
12	..	18	Noon, light breezes and fine. Employed working ship

No. XVII.

Extract from the Log of the H. C. Steam Ship Sesostris, from Aden, towards Cannanore.

[Received from Captain LYNCH, I. N.]

DATE. 1847.	HOUR.	KNOTS.	COURSE.	WIND. DIRECTION.	WIND. FORCE.	GENERAL REMARKS.
					3	
April 16th.	1	7·4	E	N N E	C M	
	2	7	..	..	..	
	3	7	..	..	..	
	4	7	..	N by E	2	Under all sail. Heavy swell from
	5	7	..	..	..	the South Eastward.—(Signed)
	6	7	..	..	..	T. G. C.
	7	7	..	..	..	
	8	7	..	..	..	
					3	
	9	7	..	N N E	N M	
	10	7	..	..	..	
	11	7	..	..	..	Lat. ob. 13·15. Long. elv. 70.28.17
	12	7	..	..	..	Lat. acc. 13·29. Long. acc. 70.33 E
					3	
	1	7 6	E	N N E	B C	
	2	7·6	..	..	..	
	3	7·6	..	..	..	
	4	7·6	..	..	..	
	5	7·6	..	..	..	
	6	7·6	..	..	..	Lightning to eastward.
	7	7·6	..	..	..	
					4	
	8	7·6	..	..	O P C	
	9	7·4	..	..	..	
	10	7·4	..	..	..	
	11	7·4	..	..	5	Vivid lightning to eastward, with
					0 2	very dark threatening appear-
	12	7·4	..	..	L	ance.
					3	
April 17th.	1	8	E	N E by N	2 R	
					L	
	2	2·4	N	W S W	..	1 40, Taken aback at the 2nd in a
	3	1·4	W	..	..	hard squall, in all sails and
	4	4	W N W	N E	3	furled. 1 20, sounded 17 fthms.
					O R	Sd. qr. 0·17 to 19·22. 22.25,
	5	3	N W	..	..	30. 1 ¦ 30 continued vivid light-
	6	3	..	N	..	ning. 1 to 2, fresh breeze, and
	7	6·6	E	..	..	cloudy squally with heavy rain.
	8	7·6	..	..	4	3, decreasing breeze.
					O 2 R	
	9	6	..	N N E	..	
	10	5·4	..	E N E	..	
	11	4	..	..	5 ¦	Lat. ob. none. Long. elv. 72.7.30
	12	2	..	..	..	Lat. acc. 13·28. Long. acc. 72.49
					6	
	1	3	E by S	N E	O 2 R	
	2	3	N by W ½ W	..	..	
	3	3	..	..	..	
	4	3	..	..	..	
	5	2	N W	..	..	
	6	1·4	..	..	..	Fresh gale and heavy sea. 3, shut
	7	1·4	..	..	..	off port boiler, vessel rolling
	8	1	..	..	..	heavily, moderate gale and heavy
	9	2	N W W	at N	..	sea, with hard squalls.
	10	2	..	to N N E	..	
	11	2	..	..	..	
	12	2	..	..	..	
					5	
April 18th.	1	3	N W ½ N	N N E	O R	
					L	
	2	3·2	..	..	..	
	3	3	..	..	..	Daylight, decreasing sea and
	4	3	..	..	..	breeze, heavy rain.
	5	2	N W by W ½ W	W	..	During the gale the sea was

Log of the Steamer Sesostris continued.

Date. 1847.	Hour.	Knots.	Course.	Wind. Direction.	Wind. Force.	General Remarks.
April 18th.	6	2	..	..	4 B C 2	very heavy, rising in high pyramidal masses, which led me to remark at the time that it was blowing much harder to windward or to the N. E. of east than we had it.
	7	2	N W	N	..	
	8	1	E N E	..	..	
	9	3	..	..	5 O P C	
	10	3	..	..	..	
	11	3	..	..	..	Lat. ob. 13·52. Long. elv. 71·13. E.
	12	3	..	..	..	Lat. acct. 13·55. Long. acct. 71·49.
	1	h to	N E	N	4 2 R	P. M.
	2	4	E	..	..	Squally with rain.
	3	4	..	..	..	
	4	4	..	.	..	
	5	4	...	..	0 P 2	
	6	4	..	W N W	...	
	7	4	..	..	..	
	8	4	..	...	..	
	9	4	..	..	..	Swayed up top gallant mast.
	10	4	..	..	3	Heavy N. Westerly swell.
	11	4	..	..	6 P 2	
	12	4	..	...	..	
April 19th.	1	4·2	E	W	3 O 2 P R	
	2	4·2	..	..	..	Heavy confused swell, passing
	3	4·2	..	..	..	squalls, vessel rolling heavily.
	4	4·2	..	...	..	5.30 taken aback, braced round.
	5	4·4	..	S b b	4	
		2	E S E	&	C 0	
	6	2½	S E			
	7	4·4	..	S W	5 C R	
	8	5	..	W N W	3 L M	
	9	7	..	..	4 B M	
	10	7	..	..	O C	
	11	6·4	..	...	..	Lat. ob. 13·28. Long. elv. 73.14·15
	12	6·4	..	..	..	Lat. acct. 13·30. Long. acct. 72·44.
		3	S E			
	1	3	S E ½ S	S W	4 B C 2	
	2	..	..	..	..	
	3	..	...	..	..	
	4	..	.	..	..	
	5	..	S S W	..	..	
	6	..	..	..	..	
	7	..	..	..	..	
	8	..	..	..	..	
	9	..	..	..	..	
	10	..	..	...	..	
	11	...	..	...	..	
	12	..	..	...	...	
April 20th.	1	5	S E ½ S	S W	4 P C	A. M., Squally appearance; in top gallant sail, and outer jib.
	2	5	..	...	...	
	3	5	..	..	..	
	4	5	...	..	..	Daylight moderate and squally;
	5	5·4	..	...	..	sounded every hour 1.35.
	6	5	..	..	3 B M	
	7	6	..	..	..	9·48, Set fore top and top gal-
	8	5	..	..	..	lant studding sail; sounded 35
	9	4	E S E	S S W	...	fathoms.
	10	4	..	...	..	Malabar Coast in sight to East-
	11	4	..	..	..	ward.
	12	4	..	..	..	

Log of the Steamer Sesostris continued.

Date. 1847	Hour.	Knots.	Course.	Wind. Direction.	Wind. Force.	General Remarks.
April 20th.	1	4	S E by S	S S W	B C M 2	
	2	3·4	..	..	..	
	3	3	...	S b b	..	
	4	3	..	at	B C 2	
	5	2	..	S Westward	R 2	
	6	1	..	..	..	
	7	⚓	..	..	..	
	8	..	..	S E	..	
	9	..	..	..	...	
	10	..	.	..	C R 6	
	11	..	..	E	..	
	12	..	..	..	..	

No. XVIII.

Extract from the Log-book of the Ship Zemindar.

[Received from the Surgeon of the Zemindar, Dr Kennedy.]

April 1847.	Winds.	Barometer.	Latitude North.	Longitude East.	Sea, Wind, and Sky, &c.
10	N or N W	29·30	1·56	53·30	Sea smooth, wind light, and sky clear
11	..	..	2·50	54·25	do do do
12	..	..	4·6	54·55·15	do do do
13	S West	29	4·50	55·30·00	do do do
14	..	..	Sun obscure	57·57·00	Heavy swell from S & East, wind do
15	N East	29·30	5·42	56·06·45	do do and cloudy
16	N N E	30·00	6·23	56·21·00	do do and sky clear
17	N N W	30·00	6·57	57·12·00	Sea smooth do
18	West	30·00	7·42	57·39·00	do wind light and sky clear
19	S West	30·00	7·50	58·05·00	Heavy swell S W, wind and sky do
20	Calm	30·00	7·37	58·23·00	do do do
21	..	..	7·23	58·50.00	do do do
22	South W	29·30	7·56	59·29·00	Sea smooth, winds light, and sky do
23	S S West	29·30	9·02	60·23·30	do Fine breeze &c., do
24	S W est	29·30	10·56	61·59·15	do do do

No. XIX.

Extract from the Log-book of the Ship Swithamley.

Date.	Wind.	Its strength by the sail carried.	Lat. and Long. at Noon.	Sky, Clouds, Sea, &c. &c.
April 18th, 1847.	N W to W N W	Double reefed top sails, squally throughout, with thunder and lightning.	Lat. 12° 25′ N Long. 70° 15′ E	Gloomy to East and N E, clear to N W and West; very heavy swell from the N E.
19th	N W to West	All sail, excepting royals and F. jib.	Lat. 14° 39′ N Long. 71° 32′ 30″ E	Heavy overcharged clouds, with thunder and lightning; heavy sea from the N E.
20th	West	Double reefed top sails, royal yards sent down.	Lat. 17° 31′ N Long. 72° 00′ 00″ E	Dark gloomy weather, with heavy rain. Saw the sun set: it appeared quite double the usual size, colour fiery red. The N E sea running very high, and breaking at times.
21st	N W to W N W	First part double reefed; from 8 A. M. moderate: made sail accordingly, and continued firm till my arrival on the 22nd.	Lat. 17° 50′ N Long. 72° 20′ E	Sky clear and fine, and the N E sea quite disappeared.

Experienced on the 20th the height of the gale: it blew at times very hard. Obliged to lower the double-reefed topsails on the cap, and stood to the S S West, when I invariably found I ran out of the gale. These violent squalls always came on from eight to nine P. M., and continued two or three hours from N. E. to East, accompanied with heavy rain, lurid lightning, and long rumbling noise like stifled or distant thunder, but appeared quite above head. These N. E. squalls forced themselves up against a strong double-reefed breeze from the N. W., and west, leaving actually no calm space between the two winds, but took us flat aback. On the 20th it blew quite a gale of wind from the west to N. W.; washed a man from the jibboom, and lost him. With very hard carrying could bear double-reefed topsails. I consider I was in one of the spokes that led to the centre of the Hurricane, and had I continued standing to the E. S. E.ward in the N. E. squalls, would in all probability have been dismasted: it always kept clear to the westward and very black to the eastward; thus I chose to stand to the first.

J. Jennings,
Commander Ship *Swithamley.*

No. XX.

H. C. Steam Frigate Auckland, from Aden to Bombay.

Date 1847.	Direction of Wind.	Force of Do.	Latitude Noon Observation.	Longitude at noon Chronometer.	Remarks.
19th April.	A M: Easterly / P M: N E by N Easterly / P M: East	3	North 12°40′32″	East 46°51′00′	1 h. 45 m. A. M. weighed and stood out of Aden; A. M., B C swell from the Eastward. P. M., B Midnight W, Ely swell.
20th ditto	A M: East / P M: E by N	2	12 48 38	48 10	A. M. and P. M., B S Wly swell.
21st ditto	A M: Easterly / P M: E by N Southerly S S E	1.2.4	13 23 32	50 18 43	A. M. & P. M. B Noon swell from the West. Midnight.. .. W Midnight do from the S East. Current N 60 W 16 miles.
22nd ditto	A M: South / P M: Southerly S S W	4	14 11 48	52 58	A. M. and P. M., B C; Midnight very heavy dew.
23rd ditto	A M: S S W Variable S Westerly / P M: S S W	1 5	15 10	56 14	A. M. and P. M., B C; Midnight W S swell.
24th ditto	A M: S S W / P M: S W	5 4	15 44	59 46 23	A. M. and P. M., B C, S Westerly swell, Current N E 12 miles.
25th ditto	A M: S W Variable at West to W S W / P M: W S W	4.5.4.4 3	16 17	63 7 00	B. C., throughout; S Westerly swell. Current south 14 miles.
26th ditto	A M: Southerly / P M: Variable at S W to N W Light Variable N E	3 2	17 10	66 0 0	B. C., noon—B C P.
27th ditto	A M: Variable N N E Variable N N W / P M: N N W	2 3	17 50 38	68 45 14	S Westerly swell throughout. Noon, B. M., midnight B C. W. current S 57 E 15 miles.
28th ditto	A M: Variable at West to North / P M: N N W	3	18 23	72 03 00	B., Southerly swell, current S 41 E. Anchored in Bombay harbour 0h 15m A. M. 29th.

No. XXI.

Extract from the Log-book of the H. C. Surveying Brig Taptee, at anchor 12 miles West of Mandavie, Gulf of Cutch.

Date 1847.	Hours.	Winds.	Force.	Weather &c.	Date 1847.	Hours.	Winds.	Force.	Weather &c.
April 22nd	2	West	5	.	Ap. 23rd	2	W S W	5	Hy. pssg. clds
	4	..	5	Hazy		4	West	6	..
A. M.	6	W S W	..	..		6	..	..	..
	8	..	..	..	A. M.	8	..	5	Hazy
	10	..	4	..		10	S W by W	..	..
	12	...	..	..		12	..	..	...
	2	West	..	..		2	..	..	.
	4	W S W	...	..		4	..	6	Thick
P. M.	6	Westerly	5	..	P. M.	6	W S W	7	Cldy. weather
	8	..	..	..		8	..	5	..
	10	..	..	Tk. pssg. clds.		10	S W	5	..
	12	S Westerly	..	..		12	..	5	.

April 24th	2	S S W	5 to 6	Lightning to westward.
	4	..	5	
A. M.	6	N W	8	5 hours 30 minutes, hard squalls from N W, with thunder,
	8	..	5	lightning, and rain.
	10	..	4	6 hours 30 minutes, weighed and stood to W S Westward.
	12	S Easterly	2	Passing squalls, thick, cloudy westward.
	2	Calm	0	Noon, light variable airs, hauling round to S Eastward, threatening appearance to S Westward.
	4	Variable	1	4 hours 40 minutes, wind shifted suddenly to S S E, and
	6	S S E	9	increased to a fresh gale, in all sail, but fore top mast stunsail.
P. M.	8	..	8	6 hours, set foresail and main top sail double reefed. 10 hours, occasional hard squalls, with very heavy rain; in foresail.
	10	..	8 to 9	Midnight, strong breezes with very hard squalls at times,
	12	..	8 to 10	continued rain, thunder, and lightning. Heavy S W swell.
April 25th	2	S S E	9	Moderate gale, with hard squalls and rain.
	4	S W	8	4 hours, wind hauling to S S W; to decreasing breezes set
A. M.	6	..	7	the courses, jib, and boom mainsail.
	8	..	...	
	10	S S W	6	Thick hazy weather, heavy S Westerly swell.
	12	...	4	
	2	S W	5	Hazy.
	4	..	4	...
	6	..	5	..
P. M.	8	..	4	Passing clouds.
	10	..	4	Do do.
	12	S W by W	4	.. On the 26th and 27th April we had nothing but light S Wly breezes, and fine weather.

No. XXII.

Extracts from Meteorological Register kept at Rajcote during latter part of April, 1847.

[Furnished by Colonel Sandwith, 23rd Regiment B. N. I.]

April, 1847	6 A. M.			10 A. M.			Noon.			4 P. M.			10 P. M.		
	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.
18	29·362	80	S S E	29·390	84	S S E	29·351	86	S by E	29·281	87	W N W	29·356	84	W N W
19	354	79	S S E	364	84	W N W	340	85	W N W	286	87	W	348	86	W N W
20	351	80	N E	380	85	N W	320	87	W	260	89	W N W	350	85	W S W
21	322	83	W S W	352	86	W N W	328	87	W N W	290	87	W N W	352	85	W N W
22	339	80	W S W	398	86	W N W	320	87	W N W	308	88	W N W	398	84	W N W
23	340	80	W S W	404	87	W S W	370	88	W S W	300	90	W S W	431	85	W S W
24	352	80	S W	443	86	S W	410	87	W N W	356	88	W S W	422	80	S W
25	380	80	S S W	430	84	S W	390	87	S W	356	87	S W	456	82	S W
26	442	80	S W	522	84	W S W	480	86	W S W	416	86	W N W	508	82	W S W

Remarks.

18.—Close and hot morning, wind S S E in the forenoon.

19.—Wind very variable, and weather sultry: out-door Thermometer at 4 P. M. 104°, and at 6 A. M., 76°.

20.—Clear sun shine all day. Hot and sultry at times. Out-door Thermometer in the shade, at 4 P. M. 106°.

21.—Very cool morning, at 5 A. M. out-door Thermometer 76°, wind strong to-day.

22.—Strong wind on sunrise; outside Thermometer at sunrise 79°, and at 4 P. M. 102°—wind high throughout the day—mostly sunshine all day, but occasional clouds about.

23.—Morning cool and cloudy—wind very high throughout the day; lightning in the north at 6½ P. M.

24.—Cool morning, wind high, large white clouds about—a few drops of rain fell at 1 P. M., slight thunder at 4 P. M.; lightning all round at 7 P. M., cloudy night.

25.—Very high wind early, a good shower at ½ past 8 A. M., hazy night, and much moisture in the air.

26.—Air full of moisture at sun rise.

No. XXIII.

MARINE DEPARTMENT, No. 1514.

Bombay Castle, 25th October, 1847.

SIR,—I am directed to acknowledge the receipt of your letter of the 18th ultimo, and in reply to communicate for your information the annexed copy of a letter from Lieutenant Montriou, in charge of the Observatory, dated the 29th idem.

I have the honor to be, Sir, your most obedient servant,

A. MALET, Chief Secretary.

TO ALEXANDER THOM, Esq.,

Surgeon, Her Majesty's 86th Regiment, Poona.

No. 32 of 1847.

From Commander C. W. MONTRIOU, I. N.,

In charge Observatory,

To Commodore Sir ROBERT OLIVER, R. N.,

Superintendent Indian Navy.

SIR,—With reference to the memorandum No. 1455, of 1847, from the Assistant Superintendent, dated September 23rd, 1847, enclosing a letter from Dr. Thom, H. M. 86th Regiment, to the Military Secretary to Government, requesting that the ranges of the Tide Gauges at Bombay, Aden, and Kurrachee, might be sent to the Bombay Geographical Society, I have the honor to state that there is no Tide Gauge in operation at Kurrachee. The ranges of the one at Aden are, I believe, regularly transmitted every month from that place to the Bombay Geographical Society. A note on the Tides at Bombay, from the 13th to the 23rd of April, was sent by me to Dr. Thom.

There was a swell at the time of high water at Bombay from the 13th to the 23rd of April last, which was the only peculiarity in the Tides indicated by our Tide Gauge at the Observatory.

The Diagrams traced by the Tide Gauge at Aden, for the above month, shew no change from the ordinary Tides.

I have the honor to be, &c.,

(Signed,) C. W. MONTRIOU,

Commander I. N., in charge Observatory.

Observatory, Colaba, September 29th, 1847.

(True Copy.) A. MALET, Chief Secretary.

Sketch

Shewing the course of the

Hurricane

of April 1847 on the Malabar coast and the probable position of the H.C.S.S Cleopatra at the time

Sig^d T.G Carless
Capt^n I.N.

* C.L. Supposed position of the Cleopatra at 8 A.M on the 17th when the Mermaid was lying to under a close reefed main top sail in a fresh gale from S.E.

ART. II.—*Remarks on the Course of the Hurricane which occurred on the Malabar Coast in April* 1847, *and on the probable position of the Steam Frigate "Cleopatra" at the time; with a sketch.* By Captain T. G. CARLESS, I. N.

[Presented by Government.]

THE following attempt to trace the Course of the Hurricane which occurred on the Malabar Coast in April 1847, is drawn up from the information obtained from the Log Books of the Steam Frigate *Sesostris*, steam vessel *Victoria*, and ships *Buckinghamshire*, *Mermaid*, *Faize Rubahny*, and *Atiet Rohoman*. The investigation furnishes another proof to those already afforded of the rotatory nature of these violent storms, and as I believe it is the first occurring on the Western Coast of India which has been submitted to examination, the subject possesses a peculiar interest.

At noon on the 16th April, it appears by the *Buckinghamshire's* Log that she was in Latitude 8° 45′ North, Longitude 73° 3′ E., with the wind blowing a hard gale from N.E. by N., and a very high sea. It is not stated what sail she was under, but as the foresail had been furled some time before, and her speed was reduced to half a knot per hour, I conclude she was lying to under a close reefed maintopsail. The *Faize Rubahny*, at the same time, was in Latitude 11° 16′ North, Longitude 75° 27′ E., with the gale moderate from E.S.E.; and the *Atiet Rohoman* at anchor off Aleppee, in Latitude 9° 25′ North, had squally weather, with the wind varying from East and E.S.E.

The data afforded by the direction of the wind at these points, although not so complete as could be wished, from the vessels being all in the upper half of the circle described by the Hurricane, is still sufficient to enable us to ascertain the vortex or centre round which it revolved with tolerable accuracy; and I am therefore induced, after an attentive consideration of the facts, to place it in Latitude 8° 3′ North, Longitude 74° 5′ E., at the spot marked A in the Chart. My belief in the correctness of this position is confirmed by observing that the *Buckinghamshire*, being nearest to it, experienced the gale strongest, and that, as she advanced to the Eastward, the wind veered gradually round from N.E. to North and W.N.W.; that at the *Faize Rubahny's* position in the N.E. quarter of the circle, upon its outer extremity, the wind was less violent, and from E.S.E.; and that the weather was still more moderate, and the breeze variable from East and S.E. at Aleppee, where the *Atiet Rohoman* was at anchor, which, as she was somewhat

nearer to the vortex than the *Faize Rubahny*, was probably owing to the interruption and disturbance caused in the course and strength of the gale by the high mountains in the vicinity. At this time the storm appears to have been revolving from right to left, looking to the northward, and this seems to have been the case throughout its duration. When the gale first reached the *Faize Rubahny*, and for several hours after, the *Mermaid*, about 90 miles from her, and standing from Mangalore to the Southward, had moderate winds and fine weather, which was also the case with the *Sesostris* Steam Frigate, then about 100 miles to the W.N.W. of the Cherbaniani Bank, and as they were entirely out of its influence, we can form some idea of the extent of space over which it prevailed, which a reference to the chart will show was a circle with a diameter of about 410 miles.

On the morning of the 17th, at 2 A. M., the gale first reached the *Sesostris*, *Mermaid*, and *Victoria*, and we have now more ample means of tracing its course and extent, as at that time the vessels were in different and opposite quarters of the circle. Their positions were as follows:—

Sesostris, Latitude 13° 14′ North, Longitude 72° 2′ E.—moderate gale from N.E. by E.

Buckinghamshire, Latitude 9° 5′ North, Longitude 74° 29′ E.—hard gale from W.S.W.

Mermaid, Latitude 12° 12′ North, Longitude 74° 50′ E.—fresh gale from SE.

Faize Rubahny, Latitude 11° 23′ North, Longitude 75° 35′ E.—heavy gale from S.E. close to her position at noon of the 16th.

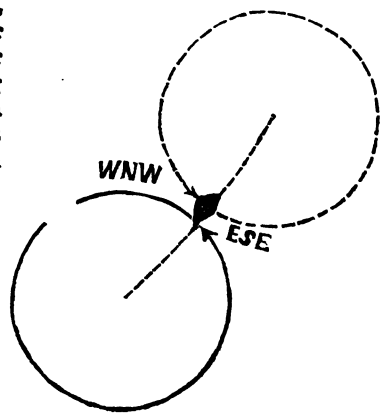
Victoria at Cannanore—moderate gale from E.S.E.

The direction of the wind at these different localities places the centre of the hurricane at this period near Underoot island (marked B in the Chart). The *Faize Rubahny* and *Mermaid*, who were nearest to it, experienced the worst weather. The latter, after lying to a few hours under a close reefed maintopsail, lost her maintopmast, and was obliged to cut away her mizenmast, and bear up before it; and the former, after having her sails blown from the yards, her quarter boats washed away, and heaving overboard a portion of her cargo, spars, &c., was obliged to follow her example. The *Victoria* steam vessel, although farther distant, also received considerable damage, and was under the necessity of throwing overboard some heavy cargo she

had on deck. The *Buckinghamshire*, being at a greater distance from the vortex, received no injury, and, although the wind was blowing a hard gale, stood on her course under a press of sail. At the N.W. extremity of the circle, the *Sesostris* had the gale more moderately, and on the S.E. side, where the *Atiet Rohoman* was at anchor, apparently a short distance outside it, the weather was merely squally and unsettled. From these facts it would appear that the storm circle had contracted considerably in its progress, and at this time did not exceed 300 miles in diameter.

Having thus ascertained the position of the centre of the hurricane at two different points, we are enabled to find its course, and estimate the rate at which it progressed. At noon on the 16th, its centre, as before stated, was found to be at A in the plan, and at 2 A. M. on the 17th, fourteen hours after, at B; and as the distance between these two points is 180 miles, it had moved in a N. by W. direction at the rate of thirteen miles per hour.

At noon on the 18th, the *Buckinghamshire* was between Vingorla and Goa, about 30 miles from the land: there the gale shifted suddenly, and blew most furiously from E.S.E. In the course of an hour all her sails were blown from the yards, her quarter boat blown away over the poop, and she lost all her masts. The violence and storming force of the wind is mentioned in her Log Book as indescribable. At 2 P. M. it fell suddenly calm, which continued until 4 P. M., when "the wind, which had died away at E. S. E., commenced with equal violence at W. N. W." She had, in fact, run into the vortex of the hurricane, which, moving upwards whilst she remained nearly stationary, caused the remarkable change of wind described above, as may be shown by the subjoined diagram.



At this time the *Mermaid* was about 50 miles to the S.S.E., running up with a fresh gale from W.S.W., with only her foremast standing, and five feet water in her hold. The *Sesostris*, 150 miles to the S.W., was standing to the Eastward, with a fresh breeze from N.W., being just without the limit of the hurricane circle. Her position again enables us to judge of its extent, which had apparently contracted to

still narrower limits, and now exhibited a diameter of only 225 miles. The distance from its centre at 2 A. M. on the 17th (B) to the spot where the *Buckinghamshire* was dismasted at noon on the 18th, (C) is 263 miles, and it had moved through this portion of its course in nearly a N.$\frac{1}{2}$W. line in 34 hours, at the rate of eight miles per hour, and had also approached within 40 miles of the coast.

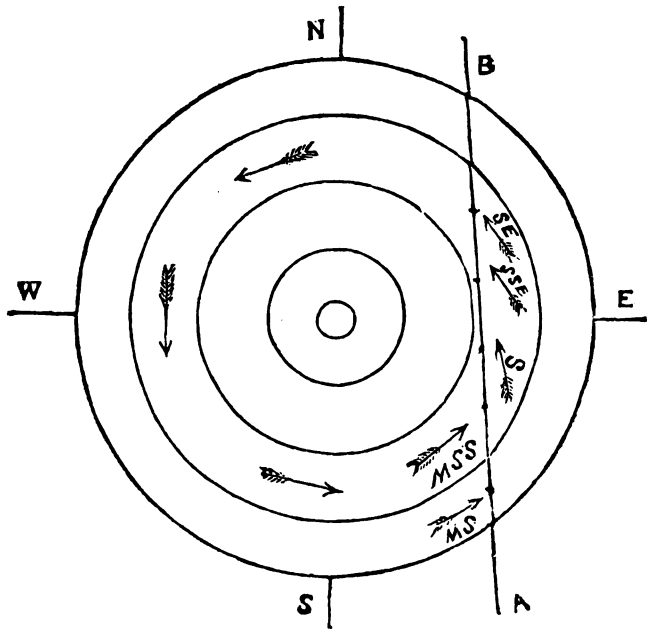
It is to be regretted that we have no means of ascertaining the track of the storm farther to the Southward and Eastward, and the direction from which it approached the continent of India. From what I have been able to glean from the imperfect information given by the native Commander of the Ketch *Ceylon Island,* I am induced to believe that it came from E.S.E., for he states that on the 15th April, when off Colombo, he had a gale from the S.E., in which he had all his sails blown away, lost his mizen topmast, crossjack yard, &c. and that, in standing to the N.W., it continued from that date veering gradually round to S.W., until the 21st, when it moderated: he farther mentions, that three days before, on the 12th, when about twenty-five miles from Colombo, he experienced a heavy gale from E.S.E., which obliged him to run before it for a whole day.

I shall now offer a few remarks on the course of some of the vessels.

At noon on the 16th, the *Buckinghamshire* was lying to with the gale from N.E. by N. The vortex of the storm was then a short distance to the S.E., and moving at a rapid rate to the North, passed ahead of her shortly after she stood to the E.N.E. under a press of sail; and during the day the wind veered gradually round from N.E. by N. to S.W. From noon of the 17th her course was about N.N.W., and she was going at the rate of 12 knots per hour, with a current of nearly two knots in her favour. As she was thus moving up with the hurricane in nearly the same direction, she remained the whole time in the S.E. quarter of the circle, and consequently had the wind steady from S.S.W. until noon of the 18th, when the line of her course, meeting that of the hurricane,—she had reached its vortex,—the wind changed suddenly to E.S.E., and blew with tremendous violence, and she was quickly rendered a mere wreck.

The centre of the storm circle passed near the *Mermaid* when she was lying to; and, as might be expected, the weather she experienced was most tempestuous. By bearing up, she followed the hurricane on a course slightly inclining towards its path, but as it progressed with

much greater velocity—her speed not exceeding four knots per hour,—it soon left her far behind. She received, however, so much damage that after the gale had subsided she was found to be in a sinking state, and her Commander was obliged to run her ashore near Vingorla, with only her foremast standing, and nine feet water in her hold. During the time she was running before the gale, the wind veered in 24 hours from S.E. to S.W. by the East, which is a proof that she was on the Eastern side of the storm circle, as the following diagram will show, the hurricane having moved over her in a N. by W. direction, from A to B.

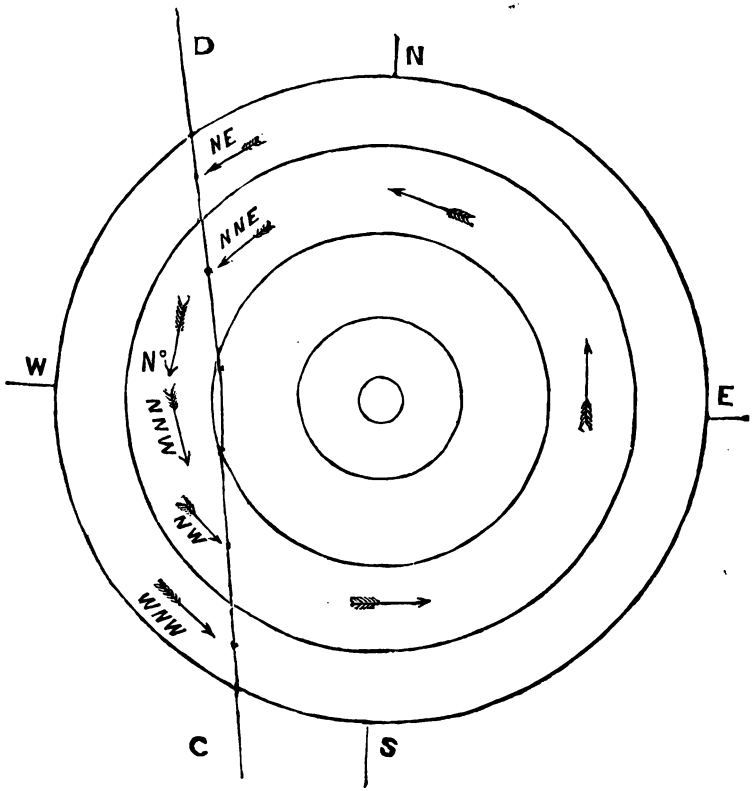


The *Faixe Rubahny* being further to the Southward, and closer in shore, was somewhat farther removed from the centre of the storm, and the gale therefore was not so violent with her as the *Mermaid*, but as she also bore up and followed it, she continued exposed to its fury for a much longer period than would otherwise have been the case. Compared with the other two vessels, the damage she received was trifling.

The *Victoria* Steam Vessel, after being forced to leave the anchorage at Cannanore, kept close in shore with her head to the Southward, by which means, although she was driven 60 miles up the coast to Mangalore, she continued in a position outside that portion of the storm circle in which the greatest violence of the Hurricane, which

also quickly passed her, was experienced; and in consequence, at the time it reached its greatest height farther to the Northward, when the *Buckinghamshire* and *Mermaid* were dismasted, the wind had moderated where she was to a fresh breeze.

When the gale reached the *Sesostris* on the morning of the 17th, she was standing to the Eastward, but a few hours after wore round and steered N.W. She thus stood directly away from it, and, although her course was again altered on the following day to the Eastward, the hurricane had then passed above her, and she consequently met with much more moderate weather throughout than any of the other vessels. During the gale, the wind veered round from N.E. to W.N.W. by the Westward, which shows that she was in the Western half of the storm circle, as may be shown thus, the direction of its course being as before N. by W.—from C to D.*



* I may here remark, that in standing up the coast after the gale, the *Sesostris* passed the wrecks of a great number of boats between Mangalore and Vingorla, and that the sea was covered with fragments.

From the above facts I think the following inferences may be drawn.

1st. That the storm was rotatory, and turned from right to left, looking towards the North.

2nd. That it pursued a course along the Malabar Coast from the parallel of Cape Comorin to Vingorla, in a slightly-curved line, inclining towards the land, the general direction of which was about N. ½ W.

3rd. That at the Southern extremity of the coast it extended over a circle of about 400 miles in diameter, which contracted gradually to a diameter of 225 miles as it moved to the Northward.

4th. That between Cape Comorin and Calicut, it moved with an average velocity of thirteen miles per hour; and from the latter place to Vingorla, of eight miles per hour.

5th. That it increased in strength, and moved with less velocity, as it contracted, and that its greatest violence was experienced on the Malabar Coast, between Calicut and Vingorla, along a track about 150 miles in breadth.

6th. That, as far as can be ascertained, it appears to have approached the Continent of India from the E.S.E.

It would be highly interesting to trace the farther progress of this storm to the Northward, for, although its extreme violence appears to have been expended at or near Vingorla, there is some reason to believe that it still pursued its course along the land, and eventually reached the shores of Cutch. From the scanty information I have been able to obtain, the same rotatory movement of the atmosphere seems to have prevailed along the Coast for several days after, but without that degree of intensity that would prove destructive, for I find that at Bombay the wind veered between the 16th and 19th of April, from N.E. to South, and was accompanied on the 19th with considerable magnetic disturbance; and that, on the 24th, the *Taptee*, surveying vessel, experienced a fresh gale on the Cutch Coast, which veered round from S.S.E. to S.W., accompanied with a very threatening appearance to the South, and preceded several days by a heavy S.W. swell.

The Log Books of the vessels do not supply much information relative to the variations in the Barometer. In the *Buckinghamshire's* Log, the height of the Barometer and Sympiesometer is given at noon on the 15th, when the former was 29·67, and the latter 29·72. From

that date no observation appears until 2 P. M. on the 18th, when she was in the vortex of the hurricane. The Sympiesometer had then fallen to 28·80, and it appears to have remained at that height during the calm that succeeded, and until it had passed over her. At 6 A. M. on the 17th, the *Victoria's* Log shows the height of the Barometer to have been 29·83 at midnight; when she was nearest the centre of the storm it fell to 29·70; and at noon next day, when it had passed her, rose to 29·90. At midnight on the 16th, the Barometer on board the *Mermaid* was 29·84, and continued constantly falling until noon of the 18th, at the time she was nearest the vortex of the hurricane, when it stood at 29·34: two hours after, it rose to 29·38, but no further observations are recorded.

During the greatest violence of the hurricane, the quantity of electric matter in the atmosphere appears to have been very great. On the morning of the 17th, the lightning darted incessantly close around the *Sesostris* in intensely vivid flashes, and the rain poured down in torrents. The other vessels also experienced similar weather.

Probable position of the *Cleopatra* Steam Frigate during the hurricane:—

The log books of the vessels proceeding down the Coast supply information of the state of the winds and weather previous to the hurricane, and a tolerably accurate judgment may therefore be formed of the position of the *Cleopatra* when she first encountered it. On the morning of the 16th of April, the *Faize Rubahny* was below Cannanore, and had the wind strong from S.E., with a high sea. The *Victoria* steam vessel, at noon of the same day, was between Mangalore and Mount Delly, and had the wind fresh from the Southward and S.E., with a heavy swell, and her speed was reduced to 4½ knots, and after sunset to 3 knots per hour. On the morning of the 17th, the *Mermaid* was off Mount Delly under double reefed topsails, the wind blowing from S.E., and at 8 A. M. was lying to under close reefed maintopsails in a strong and rapidly increasing gale.

The *Cleopatra* left Bombay on the afternoon of the 14th, passing the outer light vessel at three o'clock, and, after making a sufficient offing, would naturally steer along the coast, at a distance of 25 or 30 miles from it, so as to pass between the Easternmost island of the Laccadive group and the main in mid-channel. With the assistance of her sails, I do not think her *average speed* could have exceeded 7½ knots per hour, or that she had run more than 338 miles up

to noon of the 16th, a period of 45 hours. She was therefore about 30 miles above Mangalore, and, as the *Victoria* had had the wind from the Southward and Eastward with a heavy swell when passing that place eight hours before, it is highly probable that by this time the S.E. breeze had also reached her. Allowing this to be the case, she had for the next twenty hours a heavy sea current, and constantly increasing wind against her, and could not have made more than 90 miles, estimating her average speed to have been 4½ knots per hour. This gives 428 miles as the whole distance run from Bombay, and places her at 8 A. M. on the 17th in Latitude 12° 5′ North, about 40 miles from the land, with Elicalpine Island, the nearest of the Laccadives, 50 miles to windward. At this time the *Mermaid* must have been very near her, and was lying to under a close reefed maintopsail in a heavy gale. Allowing even that her speed whilst running down the coast was greater than I have given her, which I do not think at all probable, she would only have met the gale a little earlier, and would not have advanced more than a few miles to the Southward of the spot in which I have placed her. From the account given in the log-books of the different vessels, of the weather they experienced on that part of the coast at the time, I have come to the conclusion that the *Cleopatra* could not have reached the Laccadive Islands at the period when the hurricane first reached her; and a reference to the Chart will show that she was nearer its vortex than the *Mermaid*, *Faize Rubahny*, or *Victoria*, and consequently must have been more exposed to its greatest violence than either of those vessels.

(Signed) T. G. CARLESS,
Captain, I. N.

BOMBAY, *August* 25, 1847.

(True copy.) A. MALET,
Chief Secretary.

ART. III.—*Account of a Journey from Soor to Jahlan, and thence to Ras Roves.* By Messrs WARD, SYLVESTER, and JAMES, of the Hon'ble Company's Surveying Brig *Palinurus*.

[Presented by Government.]

FRIDAY, *November 6th*, 1845.—Landed at Soor with Mr Cole, C. in C., the interpreter, who accompanied us for the purpose of arranging with the Sheik to accommodate us with camels and guides for our journey.

On arriving at the town, which is situated on the beach, we found that the Sheik was absent on business at the other town of Soor, about two

miles inland in a north-westerly direction. Said, the brother of the Sheik, took us to his house, and refreshed us with coffee and sweetmeats ; whilst the inhabitants of the place completely filled the room in order to satisfy their curiosity by staring us out of countenance. We afterwards, accompanied by several natives, walked to the other town, which is very prettily situated in a grove of date trees, and contains a capital bazaar, and a fort, mounting three guns, built of mud. We were here conducted to the market place, where a seat was placed for us that we might wait the arrival of the Sheik, and underwent a scrutiny from the curious eyes of the natives. Some Banyans, of whom there were several, presented us with plaintains and sweet limes, which were gratefully accepted after our walk.

On the arrival of the Sheik, we returned to the town, followed by a numerous concourse of men, fully armed with swords, matchlocks, spears, &c., and having mounted us on camels, they performed a species of war-dance, accompanied with singing and firing their matchlocks, in honor of our visit. On arriving at the town, our interpreter, having agreed with the Sheik that he should provide us with camels and guides, returned to the vessel, and left us to enjoy the hospitality of the Sheik, who took us to his house, and served up to us an excellent fish curry, with dates and hulwa. We afterwards smoked a pipe with our host, and retired to rest in the house which he very politely placed at our disposal for the night.

On the following morning a considerable dispute arose as to the number of camels and men we should take, but it was at last decided that four camels, and the like number of men, would be sufficient. Before starting, an unfortunate accident occurred to the only watch we had amongst us. One of the slaves attending us, happening to see it wound up, imagined he could do it equally well, and taking it up unobserved, turned the key the wrong way, and so injured it that we lost the use of it during our subsequent journey, and were obliged in consequence to judge of the time by the sun. We tood leave of the Sheik and started on our journey, each having a camel, and the guides, riding in turn, on the fourth, first proceeding to the inland town to procure food for ourselves, attendants, and camels, consisting of dates, hulwa, and small cakes made of coarse flour.

Our route for the first six miles lay in a south-casterly direction, when we came to a well of fresh water in the midst of a date grove: having filled our water-skins, and allowed the camels to drink, we continued our journey, now in a south-westerly direction, over a hilly and very barren

country. Our road at this part skirted a ravine which had apparently been a water-course, continuous with the Khore at Soor. On arriving at its termination we took the following bearings:—Jibel Menkab, S. E. ½ E.; Jibel Minarf, E. by S. At about 8 P. M. we took up our quarters for the night in a small enclosure of trees, within a short distance of the camel-track. We were visited by two men of the Beni-boo-Ali tribe, who were passing on their way to Soor. A heavy dew fell during the night, wetting our bedding completely through.

At daylight we were awakened by the guides, who had lighted a fire from the dried wood about us, it being exceedingly cold, and having partaken of breakfast, consisting of dates &c., spread on a greasy sheepskin for a tablecloth, we mounted the camels and pursued our route in a south-westerly direction. At about 8 o'clock we reached a well, where we replenished our skins, and performed our oblutions in the best way we could. The country hereabouts presented nothing of particular interest, being very hilly, and here and there interspersed with stunted trees. We passed several flocks of sheep, tended by women, and attempted to strike a bargain, but in vain, as they would sell none but the very worst of the flock at a very unreasonable price.

At about 11 o'clock we halted in Wadee Talif, and here our guides procured a sheep, which they killed and dressed in a very original style, first cutting the meat from the bones, and grilling it, with the intestines, upon stones previously heated in the fire. Three men of the Beni-boo-Ali tribe joined us, and partook of the good cheer. At about 3. P. M. we resumed our route in the same direction, and over the same description of country, and halted for the night in Wadee Biah, the greasy sheepskin being again in requisition.

On the following morning we pursued our way in a W. S. Westerly direction. The country, as we approached the district of Jahlan, presented a more fertile appearance, the trees becoming more numerous, and of a larger growth, and the soil of a finer description. Several wild asses came within shot of us, and after staring for some time, took to their heels, running with considerable swiftness. As we gained the summit of a hill overlooking the valley of Jahlan, we descried the town of the Beni-boo-Hassan tribe about three miles distant, surrounded by groves of date trees, these being the first we had seen since our departure from Soor. The great hill of Jahlan is about seven miles distant from the town, although, from its immense size, it does not appear so distinct.

On approaching the mud wall which encloses a portion of the town, we were met by several of the tribe, who conducted us into the town,

where we were cordially received by Ali ben Saleen, the Sheik, a middle aged man with an intelligent cast of countenance, and standing upwards of six feet. A carpet was spread under the shade of one of the houses, and crowds of Arabs assembled to satisfy their curiosity: amongst them were two natives of Cutch, dyers by trade, who understood Hindoostani, and with their help we were enabled to carry on a conversation, and learned that on that day a peace had been concluded between themselves and the Beni-boo-Ali, and that a party, headed by Hamood ben Sabin, had proceeded to their town for the purpose of ratifying it. In the evening we were called to witness the return of the deputation, consisting of about fifty men mounted on camels, fully equipped for war. We were then introduced to Hamood ben Salin, the Sheik's brother, and leader of the expedition,—a most pleasing and intelligent young man, very superior to the generality of the Arabs we had seen before.

The town of the Beni-boo-Hassan is of considerable size, spreading over a large extent of ground. It is defended on the northern and eastern sides with a wall of mud, and here and there a fort of the same material: the houses are very irregularly built, and composed some of mud others of cadjan. That of the Sheik is much superior to the rest, being neatly built of cadjan, and nicely matted and carpetted in the interior. The walls were hung with glass bottles, and many articles of English manufacture, while a plentiful supply of earthenware was displayed on a species of shelf occupying one side of the apartment, and a double barrelled gun—a present from the Imaum of Muskat—hung in a conspicuous situation as being an article not a little prized by its owner.

On the southern and western sides of the town there are numerous date groves, on which much care is apparently bestowed: streams of beautiful water intersect them in various directions. In many of the groves we observed maize and cotton growing, which, by their beautiful green tint, presented a delightful contrast to the sandy appearance of the soil. There is a very good bazaar, in which the principal articles sold are dates, bread, fish, poultry, and meat (chiefly mutton); together with cotton cloth, which they manufacture with a species of hand-loom.

This tribe is possessed of several horses, some of which we saw: they are of a small compact make. Most of them have nice Turkish saddles, and they ride without stirrups.

We received a very pressing invitation from Kallipheea ben Ali, Sheik of a Bedouin section of the tribe,—who had come here as mediator between the two tribes, on account of the ensuing month being Dulbajja,—that they might perform the pilgrimage &c. unmolested: when that time has

elapsed, the war will be renewed as before; but our time being limited, we could not accept the invitation, his territory being three days' journey distant.

A slight incident occurred during the first day of our visit, which will serve in some measure to display the curiosity of the Arabs. We had signified our wish to enjoy the luxury of a bath after our journey, and were conducted to a small stream outside the town. Such was the curiosity of the people that they crowded the walls overlooking the stream, to such an extent, that, on our leaving the water to dress, one of the mud banks more laden than the rest, unable to sustain the weight imposed on it, gave way, and the fragments, together with a fat Arab, rolling in the direction where we were standing, completely buried our clothes, and we only escaped the same fate by jumping again into the stream. The natives appeared much concerned at our misfortune, and immediately assisted in removing the mud and stones, and recovering our effects.

After staying with the Beni-boo-Hassan tribe two days, we left to pay a visit to the Beni-boo-Ali tribe, from whom an invitation had been sent the day previous. We were accompanied by the Sheik, and four of his tribe, on horseback, as far as the boundary of his territory, which is indicated by a mud fort erected close to the road or camel-track: at this part a quantity of wells were being dug. The road for some distance lay, before reaching the Beni-boo-Ali territory, through thick date groves interspersed with streams of delightfully clear water, and neatly fenced in. The distance between the two towns does not exceed six or seven miles.

This town presented a very different appearance to that we had just left, the houses being more scattered, and many, which had originally been much superior to the present ones, partially knocked down, which they informed us had been dismantled by the British troops in 1821.

The Ameer, Mahomed bin Ali, received us very cordially, and, on entering his house, or rather mud hut, which was very imperfectly covered with mats, entertained us with coffee, &c. He is a man of very venerable appearance, about 70 years of age, and appears to be very much respected by his people. He showed us the letter he had received from the Bombay Government, by the *Palinurus*, and was apparently much surprised when we told him we had not brought any other for him, and were on no political mission whatever.

There is a mud wall being built round the town, but they are not at present proceeding with it. We were shewn the ground (which is just

without the walls,) where the action was fought between the British troops and themselves: there were one or two broken pieces of artillery still remaining, and in the Sheik's compound there are two entire pieces. The town is very thinly inhabited, and the people seem to have no occupation, as in the other town, where all was business: they also appear to be wretchedly poor in comparison with their neighbours. We did not find them nearly so curious as in the other town, but left us much more to ourselves. We visited the bazaar, but found it a very poor one.

On the morning of the third day we took leave of our entertainers, and commenced our journey to Roves, where the Ameer's eldest son (Hamed) was to meet us, it being his intention to visit the ship. Our route for the first few miles lay in a S.S.Wly. direction, passing several date groves: we then struck off to the westward, where nothing of any interest was presented to our view, it being a sandy desert, and here and there a stunted shrub. We halted for the night in Wadee Sahal, and resumed our journey before sunrise the next morning, travelling still in the same direction, and over the same sandy desert. At about 9 A. M. we arrived at Roves, a small fishing village composed of cadjan huts. On enquiry we found that the ship had not arrived, but was still to the northward. We met here a man who had acted as pilot to the *Palinurus* the year previous, who very kindly proffered his boat, but previously took us to his hut, (where we met the Ameer's son, who had arrived a few hours after us,) and regaled us with rice, fish, dates, &c. We then returned to the beach, and, after much delay and deliberation, the boat was launched. We embarked with Hamed and suit, and reached the ship at about 8 P. M., very much pleased with our journey, the natives throughout having been kind and attentive to us in the extreme.

(Signed.) C. G. WARD, *Acting Master.*
„ C. J. SYLVESTER, M. D., *Assistant-Surgeon.*
(True Copy.) A. MALET, *Chief Secretary.*

ART. IV.—*An account of an Overland Journey from Leskkairee to Meskat and the "Green Mountains" of Oman.* By Mr COLE, of the E. I. C. S. B. *Palinurus.*

[Presented by Government.]

ON the 22d of November, having obtained leave of absence to travel overland to Meskat, landed at the Village of Leshkairee in the Beni-boo-Ali territory. About a week previous, when off Roves, a small fishing town, I made an arrangement with one of the Bedouins in attendance on the Sheik of the Beni-boo-Ali's son, who was then on board the vessel, to

meet me at this place, and accordingly I found him on the beach in readiness to start. Our arrangements were soon completed, and in less than half an hour from landing, mounted behind my guide, as he had only provided one camel, commenced the journey by proceeding towards Jahlan, where we arrived at 9 A. M., and went direct to the Ameer's house. When about six miles from the town my guide was alarmed by the report of fire arms, expressing great fear that some foul play was going on, but after the lapse of about a quarter of an hour, a noise of an approaching party was heard. The guide was immediately with his head on the ground, and after listening for a few seconds, he jumped up and moved on merrily, pronouncing the approaching individuals to be friends: and shortly after we met, and learnt that the firing had proceeded from them. On entering the town, my guide, Akmar, having dismounted, the camel suddenly took fright at a stray bullock, and threw me. I was somewhat stunned at first, but fortunately not injured. The Bedouin shewed the greatest solicitude, and it was some time before I could convince him that no damage was done. The distance from Leshkairee is about sixteen miles: the first part of the road was very broken and sandy, the latter generally level and more firm, with the usual tree of the desert, the Acacia, called by the natives "Gharf," but not at all plentiful. As soon as the sun was up next morning, I received several visitors, all those who had seen me last year expressing great delight at my paying them a second visit, and anxiously enquiring whether I would return again next year; to which I constantly replied with the usual answer, "Insh Allah." The old Ameer, I was sorry to observe, was much altered for the worse. He appears very infirm now, and is constantly ailing, and I was much surprised to find that the fortifications he was so intent on repairing last year, were entirely abandoned, being exactly in the same state as at that time. Immediately after the noonday meal, took leave of the old Ameer, and set out in company with five or six companions for the adjacent town of the Beni-boo-Hassan's, where I purposed passing the night with my friend Ali bin Salam, who received me so courteously on my first visit to this country.

2. Two of my companions belonged to the tribe of "Beni Rasim," whose chief town, "El Wafee," I had been informed was the most flourishing in the district of Jahlan. They invited me to visit them, which I promised to do, and then parted. Having arrived in the Beni-boo-Hassan town, I proceeded direct to Ali bin Salam's house: he was out at the time, but a hundred messengers were soon in search of him with the news of Salam's (my travelling name) arrival, and in a few minutes he made his appearance. All the town soon heard the report, and, as usual, an im-

mense crowd assembled—one fellow, a slave, looking as proud as a peacock in a white jacket, and trowsers, which had been given to him by my shipmates (Messrs. Sylvester, Ward, and James,) when here. Many enquiries were made after these gentlemen, and all were greatly chagrined to find that they had actually been visited by an English doctor without their knowing it. This ignorance was extremely fortunate for the gentleman concerned (Dr. Sylvester,) for had his character been once known, the whole population would have beseiged him with an account of all sorts of imaginary diseases. Here I obtained a second guide, a man of the Hanaweger tribe, my other being a Junebi of the Beni Gharferee branch, —individuals of these tribes forming a mutual protection for each other in any part of Oman.

3. At 10 A. M. next morning took leave of Ali bin Salam, and started for "El Wafee," two hours' travel (five or six miles) bringing me to that place, and was kindly received by a young man (Abdalla bin Ali,) a cousin of the Sheik who was then absent. "El Wafee" is a walled town, —the houses larger and of a more respectable appearance, than those in the Beni Hassan country, but not so numerous. Lime trees are very plentiful; oranges, plantains, pomegranates, tamarinds, olives, and grapes, in moderate quantities; together with the usual articles, viz. git and mysably, being a kind of grass given to cattle, and dokhan, which produces a very small seed used for making bread. Barley and a little cotton is also grown, but no wheat. The Beni Rasim is not a very large tribe, amounting to no more than five hundred warriors, who are mostly armed with the matchlock, while some only carry spears, but the "jambeah" is universally worn. I found them busily engaged constructing a wall to protect their date groves from the Beni Hassan, a powerful tribe residing principally in the range of mountains above "Soor," with whom they were then at war. The rate of pay for labourers employed on this work was at the rate of one dollar for every twenty-four feet in length, the height being ten feet, and two in breadth.

4. At sunset took leave of my kind entertainer, and after two hours' travelling reached "Felaij el Maskayekh," a small Bedouin place, consisting simply of a date grove with a few miserable huts. The whole of the road from "El Wafee" was thickly covered with the Gharf tree of a much larger size than any I had hitherto seen.

5. The family of one of my guides lived here, and having expressed a wish for a drink of milk, I was nearly suffocated with the great quantities which their ideas of hospitality compelled me to swallow. Slept in the open

air, and next morning my blanket was completely drenched from the excessively heavy dew that had fallen during the night. I was anxious to make an early start to-day, as Bedeyer, my next station, the natives called a day's journey; I therefore concluded it to be distant about twenty-five miles: but with all my endeavours, it was noon before I could prevail on my guide to take leave of his family. Our road now was over a complete desert, a few bushes, and those very parched, only meeting the eye. From having set out so late, night closed in long before reaching Bedeyer, and my guides pretended to be very apprehensive, constantly stopping and looking anxiously around, and enjoining the strictest silence for fear of attracting any passing marauders: this however I felt pretty confident was merely assumed to enhance their services. As they were continually endeavouring to impress upon me the great dangers of the road, my constant reply was, that "having no feuds with the people of the country, none of them would molest an Englishman." This opinion, some time after, when they found that I was not to be imposed upon by such idle reports, they fully concurred in, admitting that in no part of Oman was there the slightest danger,—that on the contrary, wherever I went, every attention would be paid me, particularly as I was a "Serkali"—a term almost as generally understood in these parts as in India. At 8 P. M. arrived at Bedeyer, having travelled a good twenty-five miles. Passed the night in a small hut. The first thing next morning I was conducted to a silversmith's shop, where I found a numerous circle, who all rose to receive me, and coffee was immediately served round. My entertainer the silversmith was a very respectable-looking man, and had never seen an Englishman since our troops were at Jahlan. All present were very cleanly dressed.

6. Bedeyer is not a regular built town, but comprises some eight or nine date groves, which have sprung up around so many different springs: they are all separate, some three and four miles apart, the intermediate spaces sandy and barren, and the whole are situated in one large plain; the Soor mountains to the Nd. and Ed., with a range of sand-hills to the Sd. and Wd., beyond which all is desert.

7. This is the place from whence the dry date eaten in India is exported: it is the most valuable description grown, and is called mybsalee. Caravans of five and six hundred camels, laden solely with this article, leave daily for Soor in the date season, from whence they are mostly shipped for India. This trade renders Bedeyer the most wealthy place in Oman, Meskat excepted: the dates grown elsewhere being of a less valuable quality, are entirely used for home consumption. A single date tree of the mybsalee kind is worth on the average from ten to fifteen

dollars, whereas the various other descriptions never exceed five. There is not a single respectable house to be seen: the only thing like a building is a large fort with five towers, standing in the principal plantation, and inside of which is the market. The inhabitants are of the tribe of El Haiyarien, but have far more of the townspeople in their appearance than that of the Bedouin. There are several Sheiks, but none possessing any particular authority. This being the month of the pilgrimage, everything is gaiety, the principal amusements being horse and camel races; and the whole population, dressed in their best, are strolling about from morning till eve. The women, who do not cover their faces, and are not at all good looking, generally wear a profusion of silver ornaments,—the ears in particular, which are perforated in numerous places, being completely studded with large rings: the weight is supported by a cord passed through the whole and tied over the head. A large ring round the neck, with dollars pendant, is universally worn. All eyes were of course directed on me, but more especially on the part of the ladies, who collected round me in crowds, and I was not a little surprised at their strain of conversation. The most indecent questions were put to me, and the whiteness of my skin greatly astonished them,—one woman exposing my breast, to the admiration of her surrounding friends, comparing her own with it: the colour of my hair, red, was also a matter of great curiosity, and when I asserted it to be the natural colour, the exclamations of surprise by the fair sex were unbounded.

8. On the second day of my stay here, observed a large cavalcade entering the open space in front of the fort, where the races were going on, and immediately recognised one of the party to be "Said bin Abdalla," cousin to the Sheik of Soor, who I had met at that place a short time previous. I then learnt that this was the escort of the Sheik of the "Al Wahabies," (Khalifeen bin Ali,) who was en route to his own country from Soor, where he had been on a visit to the Sheik Mahomed. His arrival was extremely opportune, as I was anxious to pay him a visit (my shipmates having met him at Jahlan, and been much pressed to accompany him home, which circumstances prevented), while my guides were as desirous to avoid it, representing that part of the country to be extremely dangerous for strangers. Meeting the Sheik himself, therefore, was very fortunate, the matter being settled by my joining his party; and accordingly at 4-30 P. M. that day, riding by the side of the Sheik at the head of some forty of his followers, set out from Bedeyer and travelled till about 8 P. M., when we encamped in a small valley thickly covered with the gharf tree, for the night. A large fire was soon enlivening our

bivouac. A sheep purchased from some Bedouins living in the valley, was slain, cooked, and devoured in less than an hour: the method of cooking was by spreading the flesh on large stones previously heated in the fire. It was extremely good, and as I had tasted nothing since the morning, I might have competed with my wild companions in doing justice to it, but unfortunately there was nothing to take with it—not even a bit of salt. Before sunrise next morning we resumed our journey, and at noon halted at a small date grove, from whence the Sheik's house is distant about one mile. The first hour or two after our arrival was wholly taken up in receiving and returning salutations, every soul apparently in the place flocking towards us; and as on the approach of every new comer all present arose and remained standing till he had saluted every one of our party, I was never more pleased in my life than when a slave desired me to follow him for the purpose of taking some refreshment. I was greatly surprised to observe that even a slave on his approach to salute the Sheik, was treated with the same respect by the company rising to receive him: the slaves, however, invariably kissed the Sheik's hand, and most of them made the motion of doing so to all of us. At sunset set out for the Sheik's residence, which we soon reached, and found it a mere hut erected under the shelter of a tree. Carpets were immediately spread under some adjoining trees for the accommodation of myself, Said bin Abdalla, and our attendants, and supper served up. The Sheik did not join us, as it is not the custom for the host to do so, but made his appearance with the coffee when the edibles were removed, and remained till near midnight. In the morning, when about two miles from the date grove where we halted for the day, met a party of three Arabs and with them a slave. Some conversation took place, when I observed the Sheik order one of his followers (a nephew) to dismount and give his camel to the slave, who returned in our company, as also his companions, the three Bedouins. From observing no signs of anger at the time, I fancied they were a party purposely come out to meet the Sheik: I was therefore greatly surprised to learn, in the course of conversation, that these men had kidnapped the slave from a neighbouring tribe, and when met were on their way to Bedeyer to sell him. One of the thieves was present when the Sheik told me this, and instead of shewing the slightest annoyance at having failed in his design (the slave was to be returned,) he was one of the loudest in the laugh raised at my expense when I explained how theft was punished in my country. The slave trade was likewise discussed, and the utmost astonishment was expressed at the efforts of the English to put it down, observing that it was an indisputable fact that "negroes were especially created to be the servants of the white man."

The Al Wahabies are a powerful tribe, nearly as numerous as the Junelie, numbering about one thousand warriors, most of whom are armed with the matchlock. Their principal wealth consists in camels, possessing more than any other tribe in Oman with the exception of the El Awakman, the most powerful tribe in this part of the country, and who entirely live in the desert, subsisting on their flocks of goats, as they do not possess one single date grove. On the 30th of November, being the third day of my stay with the Al Wahabies, resumed my journey, and after three or four hours travel reached the town of Senow in company with Khalifeen bin Ali, who was about paying a visit to Meskat, where he repairs twice a year to receive "Buksheesh" from the Emaum. "Senow," a small town belonging to the Al Wahabies, and distant about nine miles from the residence of the Sheik, is situated on a hill with date groves stretching beneath. The houses, two stories high, and built of mud, are tolerably respectable; and the inhabitants number from three to four hundred. A little before midnight set out from Senow, still in company with Khalifeen bin Ali, and continued at a quick trot till 1.30 A. M., when we encamped in a small valley sheltered by the acacia, having travelled about eleven miles. Next morning I was surprised to find the valley completely crowded with men and camels, upwards of a hundred men having assembled during the night to follow the Sheik to Meskat, as none on such an occasion come away empty-handed. I was greatly pleased with the scene thus presented, as, from the morning being chilly, fires were kindled in every direction, surrounded by different parties, who, as the sun rose, approached our fire to salute their Chief. So great a number, however, was anything but pleasing to that personage, who only desired some twenty followers to accompany him; I was therefore not at all surprised, on arriving at Meskat, to hear that he had returned to his own country on the plea of being unwell, this being the only means of ridding himself of the incumbrance, for had he expressed any open disapprobation, a quarrel in all probability would have ensued as to who should be the lucky individuals to form the escort. The hint, I was informed by some of the tribe, will have the desired effect, and after a few days' delay the Sheik will be enabled to resume his journey with whatever number of attendants he may please to take. At 9 A. M. Khalifeen and the whole party resumed their journey, when we parted company, as his rate of travelling was by far too rapid and fatiguing for me. They have to make a wide circuit, in consequence of being at war with the people who occupy the direct route, which is no more than eighty miles, whereas the "Al Wahabies" will have to traverse at least twice that distance. Being very stiff from last night's journey, my progress to-day was very

slow. Passed several small date groves, but all so very poor that we could not procure a little grass for our camels: two of them were entirely destroyed, the trees being all dead from the spring in their vicinity having dried up. At 4-30 P. M. reached "Minnik," where I was kindly received by the Governor of the place, who immediately conducted me to a house,—the same that Lieutenant Wellstead occupied during his stay here. The distance travelled from the encampment of last night was about sixteen miles: the first part of the road had a range of hills on either side, and the latter environed by detached hills. "Minnik" is a walled town with narrow streets. The houses, two stories high, are built of mud and stone. The population is from four to five hundred: in Wellstead's time, (of whom particular enquiries were made) it exceeded double that number. This place has suffered more than any hitherto seen from the want of rain; no less than seven out of the eight springs with which the town was supplied are now quite dry, and, in consequence, large tracts of once cultivated land in the vicinity now lay perfectly waste, and whole date groves are entirely destroyed. The only flourishing plantation at present is to the N. and Ed. of the town: it is walled in, and formed into regular roads, the largest leading from the N. Eastern gate, being about five or six hundred yards in length. Here I saw a little sugar-cane growing: at one time great quantities were produced, for the manufacture of sugar, which they clarified with eggs.

9. On the second day of December, a little after noon, set out for "Nuswee," distant six or seven miles, the surrounding country being very hilly: passed several date plantations, many of them ruined and deserted. At 3-30 P. M. reached the town, and proceeded direct to the fort, where I found the Governor and several of the principal inhabitants, dressed quite gaily, making my appearance, which was anything but clean, still more conspicuous. I was received very kindly by the Governor, Seafe bin Ahmar, an old gentleman with a very pleasing appearance; and an apartment just outside the fort, where he resided, was immediately prepared for my accommodation. Shortly after my arrival a large party, all armed, and preceded by drums and horns creating a most discordant noise, approached the fort, when those present with the Governor joined them, and invited me to do the same. The whole party then formed into procession, the drums and horns leading the way, headed by a man who was continually crying out "a cheer for the Imaum, a cheer for his son, a cheer for the Englishman." This was responded to by the whole multitude yelling with all their might, until arriving at the grand square, when a circle was formed, and sham fights with the spear, sword, and matchlock,

took place. The tops of the houses on either side were crowded with well-dressed women with faces uncovered, but I certainly did not observe more than half a dozen pretty ones amongst the whole of them. The fight continued for about a quarter of an hour, when the party moved on to the middle of the square and commenced again. A third movement was then made, bringing us to the end, where we remained till a gun was fired from the fort, which is situated at one extremity of the square, and at the other extreme are two small towers, placed one on either side; when the word was given to face about, and we returned exactly in the same manner as in the advance, the ceremony having occupied nearly two hours. It is observed every year, at the conclusion of the pilgrimage, and continued for three days, during which time the market is closed, and business of every kind suspended. After the evening meal, the Governor, accompanied by half a dozen friends, came up to my quarters, when the old gentleman enquired if I was fond of singing; and being answered in the affirmative, he immediately dispatched a messenger to summon the "Bard of Nuswee," who he assured me had frequently performed in the presence of the Imaum's son, Said Khwainee, Governor of Meskat. The individual in question soon made his appearance, and after being regaled with coffee, commenced in true Arab style. He was rapturously applauded by the company, with the exception of my guides, who complained of not understanding a word he said: the performance, however, was tolerable, but by no means to be compared with the public singers at Cairo.

10. Nuswee, the largest town in Oman (Meskat excepted,) is situated about five miles from the base of the Green Mountains, and is entirely surrounded by hills: the heat in consequence is far greater than in other towns of the province, which are generally in more open situations. The town is built with regularity: the houses two stories high (stone) and of a respectable appearance, with narrow streets. The fort, which is round and built of stone, is about eighty feet high. I was not allowed to enter it, the Governor having orders to admit no stranger without an order from Meskat. I only saw two or three old rusty guns projecting from the embrasures. Date groves extend in every direction, but, as at Minnik, several are withered up, and a great deal of land laying waste for want of water.

11. The drought has continued now for five years, and it is feared that, unless a change speedily takes place, the whole province will be ruined. Notwithstanding all the philosophy of the Mahomedan character, the

greatest anxiety prevails throughout all classes, and I was continually applied to to know if any rain was to fall this year. The population at present does not exceed three thousand, as many families, from the ruin of their property, have been compelled to leave, generally repairing to the towns on the sea coast. It contains, I was credibly informed, nearly three hundred mosques: none of them, however, are of any considerable size—on the contrary, the majority are very small, and all built of mud, and, as they have no spires, the appearance of these buildings is very mean. The market is small but neat, and covered in: its length is about seventy-four paces, and twenty-five broad, containing four rows of shops, one on either side, with a centre building of two more. Copper vessels are manufactured here; and Nuswee was once celebrated for its sweetmeats, but none good are procurable now, from most of the confectioners having left. At noon on the third day of my stay here, set out for the Green Mountains, and a two hours' ride brought me to the small town of Tenoof, distant six or seven miles from Nuswee. This is a pretty little place, surrounded by a wall pierced with loopholes, and a castle stands at the eastern extreme, with a fine flourishing date grove to the westward. The houses, built of mud and stone, are small, and the population about three hundred. I had been given to understand that this town was actually in the mountains, but I now found its position to be immediately at the base of them. The Sheik received me very kindly, and undertook to provide me with a donkey and guide for the ascent; and at 7 o'clock next morning, having sent my camel back to Nuswee, I was again in the saddle. In five hours I reached the summit. The ascent was very steep, and the road dreadfully bad, being covered with large loose stones, so that at times I was quite at a loss how to proceed, as I could not discern the vestige of a path,—but not so the donkey, for, after taking a little rest, he would start on again, and carry me over places that I should have thought impracticable for any beast of burden. We sat down for an hour or two here, my guide being rather fagged, and then proceeded by going down a very deep descent on foot, after which the road led over a continued succession of ridges, but none too steep for riding,—four hours' travel bringing us to the first inhabited valley (Waddy bin Abeeb,) where I passed the night. This valley is narrow and precipitous, in most places not more than thirty yards across. The houses are small, and stand on one side about half way down, and both sides of the valley are laid out in terraces rising one above the other, where most of the cultivation is carried on, consisting almost entirely of fruit trees, viz. pomegranates, figs, peaches, apricots, walnuts, and sweet limes: the pomegranates are very

plentiful, and a little wheat and barley is also grown; while the hills on either side are completely covered with the vine. About noon set out for another valley, (Waddy Seek,) distant about four miles. This valley is much larger than bin Abeeb, and not at all precipitous, the approach to it on either side being by a gentle descent. The same fruit trees abound here as at the former valley, with the addition of the mulberry, which is very much prized by the natives. This was the limit of my excursion, as only five days remained to the expiration of my leave. At 10 A. M., therefore, on the 7th of December, commenced retracing my steps, and by 8 P. M. was once more partaking of the hospitality of the Sheik of Tenoof. I found the descent far more fatiguing than the ascent, and had I not been barefooted, (my shoes having been cut to pieces during my short stay in the mountains,) I would never have ventured on riding, for one false step would have been destruction to both rider and donkey.

12. The Green Mountains of Oman are merely a small part of the great range that traverse throughout this part of Arabia. The whole of the cultivated valleys might easily be seen in a couple of days, and their appearance is very tame, the hills being quite bare, and no trees of any size to be seen, with the exception of the walnut, which is cultivated with the other fruit trees in the valley. I was received everywhere with the greatest kindness, and here again frequent enquiries were made after Lieut. Wellstead. The inhabitants of these valleys indulge in wine of their own making; it is like the common black wine of Europe, only much inferior. Their excuse for doing so is on account of, as they consider it, the excessive cold of the mountains. I found it rather cold in the mornings about daybreak, but I do not think the thermometer could ever have been lower than seventy during the three nights of my stay here. I saw but few cattle, and altogether the natives appear to be exceedingly poor. Such a thing as coffee was not to be procured. At noon on the 8th of December, accompanied by two horsemen supplied by the Sheik as an escort, started on my return to Nuswee. At the moment of leaving the town a large party arrived, one of whom was the Sheik of a district about twenty miles distant: he pressed me very much to remain and accompany him home, and nothing would have afforded me greater pleasure, had I had time to do so, but as my leave expired on the 11th, I was obliged to decline. On nearing Nuswee my escort took leave, the Sheik of Tenoof being at variance with the Governor of that place. My guides were delighted to see me return on the day specified, as they were anxious to reach Meskat, for which place I desired them to be ready to start the next morning. Accordingly, at 8.15 A. M., accompanied by the

Governor and three of his friends, set out from Nuswee, and at 10.30 A. M. stopped at a small village (Fark) to breakfast, which was prepared in the mosque, when we again proceeded on our journey, and about two hours after reached a large village (Berkee) situated between hills, with a large building surrounded by a wall to the westward, and to the eastward a date grove, distant about ten miles from Nuswee: here we came to a halt, a carpet being spread under a tree for our accommodation. As this was the place where I was to part with my kind host, he insisted that I should spend the remainder of the day with him: it was therefore arranged, that, as I had no time to spare, my delay during the day should be made up by setting off immediately after the evening meal. The inhabitants of this village appeared to be in very good circumstances, and all were desirous that I should prolong my visit. A short time after sunset sat down to smoking dishes of rice and goat flesh, with liberal supplies of milk for drinking. I was placed by the side of the Governor, an extra dish of five wheaten cakes, soaked in ghee and sugar, being prepared for our particular gratification. Directly after coffee took leave of the worthy old Governor, who expressed great hopes of seeing me again: his friends, however, still accompanied me (one was his brother-in-law,) on account of the natives of this part of the country being very suspicious of strangers, particularly of Bedouins. Travelled till midnight, when we halted for the night at a travellers' bungalow in a village named Mettee. Most places in Oman have a building set apart solely for the use of travellers. On awaking the next morning found several of the inhabitants seated around a blazing fire with my companions, and soon after an excellent breakfast was provided by the Sheik of the village; after which the journey was again resumed, one hour and three quarters bringing us to a valley inhabited by the "Beni Ruwahi" and "Beni Yaber." At 11 A. M., one hour after entering the valley, alighted at the Sheik's house. Here my friends from Nuswee left me, a son of the Sheik's taking their place. After coffee, remounted, and at 4.45 P. M. reached "Sumaiyel," having travelled since the morning about twenty miles. This valley, known by the name of "Waddy Beni Ruwahie," is about fourteen miles in length, and generally very stony. The first part is narrow, but opens out gradually, with date groves throughout, protected by towers on the neighbouring hills on either side of the valley, and is in consequence considered almost unassailable by the Bedouins.

13. On arriving at Sumaiyel, took up my quarters in a large room just outside the principal fort, where the Governor (a Beloochee) resides. This I found to be a place of considerable extent, and the most flourish-

ing of any that I had seen in Oman. Water was plentiful; the date groves, which are very extensive, were in the best condition; and everything about looked green and healthy, forming a great contrast to the other parts of the country that I had passed through. The scenery, too, was far superior, the surrounding country being very hilly, with small fortifications on different heights; but all of them are in a sad state of dilapidation, and none possess any artillery, except the citadel, and that only boasted of two or three rust-eaten six pounders. Early the next morning left Sumaiyel. My guides were not at all pleased with the Beloochee Governor, because he had not furnished a very sumptuous supper the preceding evening, though, considering his means,—his pay not being more than twenty dollars a month,—I thought our entertainment very good. I was sorry to find that my guides on all occasions were very greedy, as, when anything superior, such as sweetmeats, was supplied us by the people through whose district we passed, they were not satisfied with what they eat at the time, but invariably, when an opportunity of doing so without detection offered, pocketed as much as they could, notwithstanding my remonstrances against such conduct. Throughout the day's journey the country was very hilly, with date groves here and there. A little before sunset put up for the night in a small village about nine miles from Meskat: this was the only place where the slightest inhospitality was shewn me during the journey, the natives declaring that they could neither give or sell us any kind of food—not so much as a little rice, or a cup of coffee, but were anxious that we should proceed, by declaring that there was a large village a little further on, where everything in abundance might be procured; but, in consequence of a fall from my camel in the afternoon, which had stunned me, I was in no condition to travel more that day, so that I was determined to abide here for the night. My guides did not approve of this resolution by any means, as they did not at all relish the idea of going to bed with empty stomachs. Being very much knocked up I soon fell asleep, and on awaking about two hours after, I was greatly surprised to find a goodly supper of rice and meat, with a large bowl of milk, placed before me. On enquiring how this came to pass, in a place where at first things had appeared so unfavorable, I learnt that my guides, hearing that a woman, whose husband was in Government employ at Meskat, resided in the village, repaired to her with the information that a sick "Ingleez" had arrived, and was very much in want of some refreshment, for which liberal payment would be given. The appeal was not in vain, for she set about preparing supper forthwith, but rejected all offers of money. For-

tunately I had some few things remaining from the presents supplied me on leaving the vessel, though none of any value, with which I was enabled to make some slight return for her extreme kindness. Before sunrise next morning, 12th December, mounted my camel for the last time, and at 9.30 A. M. reached Matrah, and was rather disappointed to find that the vessel had not yet arrived, as I had been informed, when at Sumaiyel, that she had arrived three days previously, which induced me to hurry on with all speed. At Matrah I immediately took boat for Meskat, where I was soon comfortably lodged in the Agent's house. Being much in want of clean linen, and having none of my own, I was glad to put on the flowing robes of the East till the arrival of the ship, five days after, enabled me to obtain a fresh supply of my own costume. The only animals I could learn of as inhabiting Oman, were the following, viz. a large animal the size of a bullock, with straight horns, and perfectly white, called Aboo Sota, and the Ibex, as also hares, gazelles, wolves, foxes, and leopards, the whole of which are eaten by the Bedouin. Rock salt is very plentiful, and likewise brimstone.

The natives of Oman do not smoke, and none of their mosques have spires,—in which they resemble the Wahabies, for whom, however, they have a great dislike, and are rather apprehensive that this sect will again become troublesome to their neighbours.

(Signed.) C. S. D. COLE.

(True Copy.) A. MALET, *Chief Secretary.*

ART. V.—*Report from* R. N. C. HAMILTON, *Esq., Resident at Indore, of a trip down the Nerbudda from Mundlaisir to Baroche,* made by Lieutenant H. L. EVANS, of the 17th Regt. Bombay N. I., and Deputy Bheel Agent. *With sketches of the Sansadara, and of a proposed Road along the North Bank of the Nerbudda to Dauree,* by Lieut. R. N. KEATINGE, Assistant to the Superintendent of Nimar.

[Presented by Government.]

No. 1266 OF 1847.

From R. N. C. HAMILTON, *Esquire, Resident at Indore,*
To R. K. PRINGLE, *Esquire, Chief Secretary to Government of Bombay.*

DATED INDORE RESIDENCY, *24th August,* 1847.

SIR,—I have the honor to transmit, for submission to the Hon'ble the Governor-in-Council, the accompanying copy of a report of a trip

down the Nerbudda from Mundlaisir to Baroche, made by Lieutenant H. L. Evans, of the 17th Bombay Native Infantry, and Deputy Bheel Agent, under my orders.

2. Lieutenant Evans is the first officer who has, when the river is full, in the rainy season, or at any other time, examined the stream continuously from Mundlaisir to Baroche. His report is a simple and clear narrative of the impediments and difficulties which have to be overcome before the Nerbudda can be made available for the transport of merchandize and traffic.

3. Above Mundlaisir to Hoshungabad, a frontier military station in the Saugor territory, there are two places where the passage of boats is obstructed,—one at the falls at Mundhar, and the other at Dharee. Annexed is a report from Lieutenant Keatinge, Bombay Artillery, Assistant at Nimar, of the River from the Dharee falls to Mundlaisir, which he has just visited, so that the information now submitted is, in fact, from the Dharee falls to the sea.

4. Above the Dharee falls to Chandghur, 12 miles, the natives informed Lieutenant Keatinge that the river was navigable and open.

5. Lieutenant Keatinge thus describes the river:—

"Para. 5. On the upper and eastern side of the falls of Dharee, the rock slopes into the river at an angle of from one to two degrees, and is so smooth and level that in most places a cart could even now be drawn over it. Below the falls, the rock ends in abrupt and irregular steeps of from ten to fifty feet, and during the three days I spent at Dharee I looked in vain for a slope to the water's edge.

"6. Within half a mile of the village there is a perpendicular rock 51 feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description, and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls, is only a distance of 1,490 yards, which could be made fit for carts, at the cost of 4 or 500 Rupees."

6. It is clear, from this report, that boats cannot be got over the Dharee falls, but from their foot Lieutenant Keatinge came in a boat with six boatmen, about the same number of attendants, and a good load of baggage, to Ooncar Mundatta, a distance of 20 miles, in five

hours, without meeting any obstacle or delay,—that is, from noon till 5 P.M. of the 3rd August. From Ooncar, Lieutenant Keatinge continued his voyage on the 4th to Mundlaisir, where he arrived in eleven hours without any sort of difficulty or impediment (except from an adverse wind), the distance being 30 miles.

7. Lieutenant Keatinge made also the trip from the Dharee falls to Mundlaisir in March 1846, the river being open at that season, though the stream was then very shallow.

8. On the 22nd July, Lieutenant Evans left Mundlaisir, and reached Chiculda on the 24th, a distance of about 60 miles. At the Sahesdareh falls was the first obstruction, but this was avoided without material delay or difficulty, the boats going by the middle channel.

9. Lieutenant Evans left Chiculda on the 25th, and reached the Hirn Phal, about 16 or 17 miles by, noon of that day, without meeting with any sort of obstruction. At the Hirn Phal the river had risen 18 feet above the hot season water mark, and Lieutenant Evans experienced very little inconvenience in descending this rapid, but a mile beyond, at Boorkhairee, is the chief obstacle : the boats, however, were got down the southern channel with some difficulty. Two miles further on, is the Gunnoee Ghaut, another rapid similar to the Boorkhairee : the fall, however, is inconsiderable, and the bed of the channel could easily be cleared and improved from hence to Beytala, 20 miles, (a Bheelala village four miles below the Hutnee river) : the passage is clear and deep, and no difficulties were encountered.

10. At Beytala is an obstruction very much resembling the Sahesdareh falls, which Lieutenant Evans passed by easing his boats down, guiding them by ropes. Half a mile below Beytala is a very bad rapid, which was cleared by a channel under the north bank, down which the boats were tracked. The river hence is deeper, very rapid, and free from material obstructions, and so to Haump, 25 miles from Beytala. Here the river narrows, and about two miles below Haump, commences a series of rapids known as the " Bala Gori," which continue for four miles. The river, being much confined, rushes rapidly between high rocks, through which, with ordinary care, a large boat can be navigated. Lieutenant Evans' raft of canoes here got swamped, the waves washing over and into the canoes, whilst the large flat-bottomed boat passed without trouble.

11. Hence to Soolpan, 25 miles from Haump, there is no difficulty. Six miles below Soolpan, the Mookree falls are encountered : the river

at its ordinary height in the rains (25 feet above hot weather mark) covers the rapids, and the passage is safe. The boat shot them with little trouble: the fall, however, when the river is low, is from 8 to 10 feet, but, as at the Sahesdareh, there is a backwater passage always available. At Mookree the hills end, and thence to Tullukwarra, about 20 miles, the river is navigable and easy.

12. From Tullukwarra to Baroche boats of large size are constantly passing.

13. From the foregoing, it is evident that Lieutenant Evans' trip has established, that a laden boat of moderate tonnage can be floated from the Dharee falls above Mundlaisir to the sea, without any considerable risk, during the rainy season when the Nerbudda is full; and that a boat could not be brought up the whole distance against the stream from the sea at that season, owing to the rapidity of the current.

14. If, then, the Coal, such as was sent by me to Bombay last May, and which is found in the Satpoora range of hills on the left bank of the Nerbudda, can be brought to the river bank at Dharee, or perhaps above, it may be floated to Baroche on boats to be constructed of the wood which is abundant in that neighbourhood, which boats may, at the commencement of the experiment, be disposed of to advantage after they have delivered their cargoes, or may return laden to Haump, to which place goods are now brought at certain seasons by water.

15. It is my intention, in January next, when the jungles are safe, to proceed, in company with Lieutenant Evans, from Chandghur to the Coal fields, and by personal enquiry to satisfy myself as to their precise locality, their distance from the nearest point of the Nerbudda, their probable extent, the cost of digging a certain quantity, and the expense of transporting it to the river and to Baroche; and, if possible, to make arrangements for the dispatch of a boat-load or more next season, that the experiment may be fully tested,—it being of the first importance that Bombay should, if possible, be independent of foreign supply for coal for its sea-going steamers.

16. In respect to Lieutenant Evans' observations as to the means for making the Nerbudda available to commerce, I have great doubts whether the returns would compensate for the outlay. The formation of roadways to transport the freight of boats at the different falls, may be undertaken, but they alone will not suffice; there must be a line

of boats to carry on the goods which may be sent, and an unity of working, which only could be secured by a River Company, or by a Government establishment.

17. If the transport of coal should answer, doubtless improvements will follow, and other produce could be carried: the subject is one of great interest, and shall receive every attention from me. Meanwhile, I hope the enterprize of Lieutenant Evans will be deemed such as to merit the approbation of the Governor-in-Council, for it was attended with much personal risk and exposure, all of which Lieutenant Evans voluntarily incurred to establish the fact of the practicability of navigating the Nerbudda during the rainy season.

I have the honor to be, &c.,

(Signed) R. N. C. HAMILTON,

INDORE RESIDENCY, *24th August*, 1847. *Resident.*

Report of a Voyage down the Nerbudda from Mundlaisir to Baroach, in the month of July, 1847.

I LEFT Mundlaisir on the morning of the 22nd July 1847, having two boats—one the common ferry-boat, flat-bottomed, wall-sided, about 30 feet long, 4½ broad, and 2½ high, requiring four men to manage, and capable of carrying six maunds pucka (2,880 lbs.); and the other consisting of three canoes lashed together, with a platform of bamboos upon them. This latter I took, having some doubt as to the possibility of getting a large boat down the Hirn Phal rapids, remembering what Captain Anderson had done (vide his report,) and intending, in case of extreme difficulty, to unlash the canoes and carry them round the rapids, launching them again below. The result, however, will show that the flat-bottomed are the boats of all calculated in all seasons for this navigation.

2. We reached Chiculdah on the 24th, a distance I suppose of nearly 60 miles; the only obstruction below Mundlaisir to this point, is the Sahesur Dharra.* This has been so well described by Captain Anderson, that I need not enlarge upon it. It can either be got over by a road along the southern bank, or by, as he proposes, deepening the

* The boats were let down by ropes attached to the helm, by a channel in the middle of the belt of rocks, the said channel being a rocky slope, in which the water was some two feet deep. In the fair weather, when the river is low, boats go by the backwater channel.

backwater: should the former, for reasons hereafter given, be preferred, the accompanying plan, drawn by Lieutenant Keatinge, of the Bombay Artillery, assistant at Mundlaisir, who has kindly levelled and surveyed this spot, will show the road proposed,—a distance of about 1,200 yards in all.

3. I left Chiculdah on the 25th, and reached the Hirn Phal at 12 of noon. This distance, about 16 or 17 miles by the map, is perfectly clear, and free of obstruction: Captain Anderson calls it 25 miles, but I think this is a misprint for 15. The river, when I reached the Hirn Phal, had risen about 18 feet above hot weather height. I had often before been at the place, and was therefore enabled to estimate the height with tolerable accuracy. Like Captain Anderson, I experienced very little difficulty in descending this rapid, for it is nothing more; but it is the Boorkherry rapid, one mile below, that offers the chief obstruction: this Captain Anderson mistakes for the Hirn Phal, whereas the first place goes under that name. The Boorkherry rapid I succeeded in getting my boats down with some difficulty by the southern channel, but a road, I am inclined to think, would be the best mode of overcoming this obstacle, as, when the river is low, the length of the rapid would increase the difficulty considerably. The immense height to which the river rises in the monsoon—sometimes 70 feet above hot weather height—would be a serious objection to a lock or locks; but on this point I am not competent to speak.

4. About two miles lower down, (or even less,) is another place, called the Gunnoee Ghaut, the features of which are precisely similar to the Boorkherry rapid. Here, however, the fall being inconsiderable, it would be necessary only to clear away the detached fragments of rock in the bed of the channel to render it perfectly passable. From hence to Beytala, 20 miles, a Bheelala village on the north bank, four miles below the Hutnee river, the river is clear and deep, and the voyage offered no difficulty.

5. The hills on either side, from Dhurmkai above the Hirn Phal, to Beytala, rise to a good height, and are covered with jungle—inhabitants very scanty. Dhurmkai is inhabited by a few Bheels, under Kaloo Singh Bheelala. On the north bank, 10 miles lower down, is the large Bheel hamlet of Dussana, the people of which were formerly notorious for their predatory habits, but they are now peaceable enough. 6 or 7 miles beyond this, about one mile inland from the mouth of the

Hutnee, is Kukrana, a Bheelala village in the Rajpoor district; and two miles lower down, on the south bank, is Bhadul, a Bheel village, the residence formerly of the notorious freebooter Bamun Naik, now held by his son, a peaceable reformed character.

6. To Kukrana, Captain Anderson penetrated, and it was the fear of Bamun Naik, then openly in arms, that caused his boatmen to refuse to advance.

7. At Beytala is an obstruction very much resembling the Sahesur Dharra. It is a belt of rocks stretching diagonally across the river: from the middle to the north bank the rocks are perpendicular, except in one narrow channel near the bank, but towards the south bank they are worn away, and I found little difficulty in letting my boats down, guiding them by ropes attached to the stern: there may, however, be more trouble in doing so in the dry season. When I passed, the river was fully 20 feet above hot weather mark.

8. Below this again is a very bad rapid, about half a mile from Beytala. I tracked my boats down near the northern bank; but am inclined to think that there is deeper water in the middle of the river, merely obstructed by some large rocks, which just showed their heads above water at the bottom of the rapid, and caused such a sheet of broken water that I dared not trust my boats within it.

9. From about five miles below this, the hills rise to a much greater height; scenery magnificent, and the river deep, very rapid, and free from material obstructions. Both banks are studded with Bheelala villages, but the jungle is very dense around their little patches of cultivation. The rocks forming the banks are high—in many parts almost perpendicular; the stream has a current of about six miles an hour. From Bhadul the southern bank is Akranee, a portion of Khandeish; and the northern from the Hutnee is Meetwar, a Bheelala Thakoorship.

10. To Haump, 25 miles, the features of the river are the same—lofty hills, scarped rocky banks, deep channel, here and there rapids of no consequence, and a strong current. Haump belongs to the Rajah of Oodeypoor, a feudatory I believe of the Guicowar, and is merely a temple, there being no village. Here the river narrows still more, and about two miles below commences a series of rapids, known as the "Bala Gori," of the difficulties of which I had heard

much. It continues about four miles. The river, much confined, rushes rapidly between high rocks; and with ordinary care in a large boat there is no danger. But with the raft, the waves washing in, filled the canoes and swamped them, and we had to swim for it; whereas the flat-bottomed boat passed without trouble: nevertheless it is a place would always require care; yet as it became known, I have little doubt it would be scarcely thought of.

11. As far as Soolpan, 27 miles from Haump, the river is as I have described it above. Six miles below Soolpan are the Mookree falls. These being always mentioned as nearly if not totally insurmountable, I examined carefully. The river at its ordinary rainy height, about 25 feet above hot weather mark, covers the rapids entirely, and we shot them with little trouble. But when the river is low, there is a fall of 8 or 10 feet. Now all the people spoke of the existence of a backwater, by which, as at the Suhesur Dharra, I can conceive no obstacle to boats passing either up or down: moreover, from my own enquiries, and as mentioned by Lieutenant Elwan, of the Honorable Company's Marine, (vide his report) it seems that small boats do actually now ascend and carry kupra kerana and salt to Haump, whence they return with timber. Lieutenant Elwan says that toonies drawing three feet water go up; but my informants only spoke of canoes which draw when loaded six inches. However, all whom I conversed with agreed that nothing exists to prevent large boats from going up to Mookree and the Hills, and there end the difficulties: from hence to Tullukwarra, about 20 miles, is plain sailing; and below that, boats of large size come up constantly.

12. On carefully considering the character of the river, I may, I think, venture an opinion, that it would take very little to render it navigable, in the following manner, although I should like to see it as well in the fair season, when it is low, so as to leave no room for doubt, as during my voyage it was swollen.

13. At the Suhesur Dharra, the Hirn Phal, and Mookree, perhaps also at the Beytala Ghaut, a road along the bank might be formed, for which the nature of the banks offers great facilities. There would be objections to the plan, chiefly on account of the trouble and delay of unloading and reloading above and below, but when the difference of expense between a road and locks is considered, I think the former will be considered preferable: moreover, by it the boatmen on the river would only have to work in their respective districts. The

Burwari, Mundlaisir, and Mhyshwar, men would work between the Suhesur Dharra and the Dharree falls (above Oonkar Maundata.) The Ackberpoor, Dhurrumpooree, and Chikuldah, men would carry on to the Hirn Phal. From thence, another stage (or two) would bring to Mookree, below which the Tullukwarra boatmen come into play. At present there are no regular boatmen between Hirn Phal and Mookree, (about 80 miles) the canoes that come up to Haump being brought by fishermen and others incompetent to manage a larger boat.

14. The map accompanying Mr. Shakspear's resume of reports upon the river, is generally speaking very accurate. There are a few inaccuracies between Hirn Phal and Haump, but of no consequence. I regret that when my canoes were swamped at the Balagori rapids, my papers containing the bearings of the river in that part were washed away.

15. I may add, that the difficulties to be surmounted seem to me to have been very much exaggerated. Such was also the opinion of my friend and brother officer Captain Anderson, and I feel great pleasure in having followed where he had led the way. He was the first to descend the Hirn Phal—it was when the river was low (in March); and he felt confident, as do I, that the obstructions below the Hutnee river, beyond which his boatmen's fears prevented his proceeding, were no more insurmountable, even at that season, than those above the Hirn Phal for instance, which until his time was considered perfectly impassable for even empty boats.

16. I have navigated the river above Mundlaisir for 60 miles to the Dharree falls; to which place it is perfectly passable, and boats constantly go up. At Dharree, a road would also be required. Above Dharree, the falls of Mundhar are spoken of as bad; but the report is by a native, and I have no doubt it is by no means worse than those below: indeed, the present Colonel Ousely, when formerly at Hossungabad, states that, from his enquiries, he is convinced that Mundhar can be cleared. We should then have communication from Hossungabad, near which the coal is found, to the sea. Coal, grain, linseed, and many other of the products of Central India, amongst which not the least considerable would be opium, would pass down; and from October, goods, cloth, spices, cocoanuts, and Europe articles, supplies could come up. The places where roads would be re-

quired would be as depots : the distance of porterage would be trifling ; and in the rains, the time when coal could be sent down, even that would be diminished.

1st	stage, Hossingabad to Dharree, about	100	miles.
2nd	do. Dharree to Suhesur Dharra,	70	„
3rd	do. Suhesur Dharra to Hirn Phal,	67	„
4th	do. Hirn Phal to Beytala Ghaut,*	20	„
5th	do. Beytala Ghaut to Mookree,	60	„
6th	do. Mookree to Baroach, about	80	„

17. I arrived at Baroach on the 1st August, having accomplished the whole distance from Mundlaisir in eleven days, during which I was 102½ hours actually under way. The distance between Dhurmkai above Hirn Phal, and Mookree, about 80 miles, occupied 21½ hours only, although spread over nearly five days.

18. The various reports referred to in this Memorandum—Colonel Ousely's, Captain Anderson's, and Lieutenant Elwan's—I have quoted from a resume made by Mr. Shakespear, Assistant Secretary to Government N. W. P., entitled "Notes on the Navigation of the Nerbudda," and which, with the map accompanying, require to be referred to to render this intelligible.

(Signed) H. L. EVANS, *Deputy Bheel Agent.*

(True Copy) (Signed) W. F. EDEN, *1st Assistant to the Resident.*

From Lieutenant R H. KEATINGE, *Assistant to the Poll. Agent, Nimar,*

To Captain P. T. FRENCH, *Poll. Assistant in Nimar.*

DATED MUNDLAISIR, *6th August,* 1847.

SIR,—I have the honor to inform you that, according to your suggestions, I left Mundlaisir on the 29th of July, and proceeded towards Dauree, to see if a road could be made along either bank of the Nerbudda so as to circumvent the falls opposite that place.

2. Leaving Burwai on the 30th of July, I proceeded to Seylanee, a distance of 14 miles, by the road lately cleared. About six miles from Burwai the jungle becomes a forest, and continues so to Dauree, which is 18 miles from Seylanee.

* I am by no means certain that a road would be requisite at Beytala.

3. During the whole of the day, as I rode through the forest, I was surprised to see large and old timber left uncut within a mile of the river, but on enquiry was informed that it was impossible to transport any but the smallest-sized trees, even that short distance, owing to the absence of tolerably clear paths.

4. Bamboos, however, are cut in great numbers and brought to the falls, where the Gonds who carry them there exchange them for grain with speculators from Mundlaisir and Mehasur.

5. On the upper or Eastern side of the falls of Dauree, the rock slopes into the river at an angle of from one to two degrees, and is so smooth and level that in most places a cut could even now be driven over it; below the falls, however, the rock ends in abrupt and irregular steps, of from ten to fifty feet, and during the three days I spent at Dauree I looked in vain for a place where a road could be made without considerable expense to slope down to the water's edge.

6. Within half a mile of the village there is a perpendicular rock, fifty-one feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description, and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls, is only a distance of 1,490 yards, which could be made fit for carts at the cost of 4 or 500 Rupees.

7. Timber, both large and of good description (ungun,) grows on the spot, so that no difficulty exists to large and powerful (though doubtless rough) cranes and windlasses being constructed on the very rock where they are to be used.

8. Many of those who now go up the Nerbudda for the purpose of buying or cutting wood, leave their boats at Dauree, whilst others with great labor drag them (if light enough) over the rocks. But for this, many men are required: all these are of the poorest of these poor provinces, and unaided, will never be able to afford the expense of in any way surmounting the difficulties of the river at Dauree, but I feel convinced that were such a measure undertaken, we should see a trade spring up between this and the Hosungabad Provinces.

9. Several natives with whom I conversed, had been up the river as far as Chund Ghur, the site of the great Iron mines, twelve coss above Dauree, and report the stream quite as clear as below.

10. On the 3rd of August, at twelve o'clock, I left Dauree in a boat with six boatmen, about the same number of attendants, and a good load of baggage, and arrived at Ooncar, a distance of twenty miles, at 5 P. M., without meeting any obstacle or delay.

11. On the 4th of August, I left Ooncar at five A. M., and arrived at Mundlaisir (thirty miles) at six P. M., having stopped an hour on the way. Our progress this day was much impeded by a smart westerly wind, but the river presented no sort of difficulty.

12. During the rains of 1845 I went by the river from Mundlaisir to Ooncar, and back; and in March 1846, I proceeded from Ooncar to Dauree and back again, the stream being at that time very low; but on neither occasion did I meet with any obstruction.

I have &c., (Signed) R. H. KEATINGE, *Lieutenant,*
Assistant to the Political Assistant in Nimar.

P.S.—I have the honor to enclose a Section of the proposed Road along the Northern bank of the river at the falls.

(True Copy) (Signed) W. F. EDEN, *1st Assistant to the Resident.*
(True Copies) J. G. LUMSDEN, *Secretary to Government.*

Note on the Navigation of the River Nurbudda. By Mr A. SHAKESPEAR,
Assistant Secretary to Government N. W. P.

Importance of the subject.

THE benefit which would result from opening a direct communication from the sea into the heart of Central India, by means of the Nurbudda river, was acknowledged by Major-General Sir J. Malcolm as far back as 1820, and steps were taken by that officer for collecting the necessary information.

Since then, although no regular scientific enquiry has been instituted, yet Government has, from time to time, shewn itself alive to the importance of using the stream of the Nurbudda as a medium of communication, and making it an outlet for the produce of the neighbouring country.

Channel for the produce of the valley of the Nurbudda.

Upon its waters the products of the valley of the Nurbudda, rich in mineral and vegetable resources, would be borne to a market, and available for adding incalculably to the national wealth.

Making coal-beds available.

But it is only of late years, since extensive coal-beds have been discovered to exist within a short distance of its banks, and the value of the mineral to be there procured has been tested and established, that the still greater importance of this stream has been felt.

In the present day, when steam communication has become so extensive and so necessary, we cannot too deeply feel the importance of relying upon this country alone for the supply of coal required for its consumption. No coal has been found nearer to Bombay than that above alluded to in the Hosungabad district. All this supply therefore would be available for the western coast. The discovery of coal-beds at a nearer point than they are now, is so remote a contingency, that it can hardly be said to affect the present question.

The following compilation has been made with a view to exhibiting, in a concise form, all the authentic information which has been obtained up to the present time regarding this important river.

Information whence obtained.

The materials from which it has been drawn consist chiefly of official documents on the records of Government, extending from 1820 to the present time. An extract has, however, been appended from an interesting report, to be found in Appendix No. II. of Malcolm's Central India, on the Geology of that part of the country, furnished by Captain Dangerfield.

The map (reduced from one compiled in the Office of the Surveyor-General of India,) which will be found attached, shows the course of the river from Hosungabad to the sea. On it the principal obstacles to the navigation are noted.

The information how to be exhibited.

The amount of information already acquired may be best exhibited by dividing the whole length of the river, from Hosungabad to the sea, into three portions, and treating each separately.

1st.—From Hosungabad to Mundleysir.

2nd.—From Mundleysir to Tulluckwara, and

3d.—From Tulluckwara to Baroche.

1st Portion.

Hosungabad to Mundleysir.—The river taking its rise in Gondwarra, passes Hosungabad in a stream of about 900 yards broad, and is at this point distant about 318 miles in a direct line from the sea.

1st. Native Surveyor in 1833-34.

Between Hosungabad and Mundleysir our first information regarding the stream is derived from a report made by a native surveyor employed by Captain Ouseley, Principal Assistant to the Governor-General's Agent at Hosungabad.

This survey * was made in 1833-34, and from it Captain Ouseley considered that "the possibility of making the whole river navigable exists, but the expenses would be great, with the exception of Dhadree, where a lock would be requisite, or portage if an uninterrupted navigation were adopted. There is no place from Behraghur near Jubbulpoor to the mouth of the river, that might not be rendered passable for such boats as are now used, thirty or forty feet long and eight or ten wide, flat bottoms. All the places in the sketch marked as rapids, could, with trifling expence, be rendered passable. Mundhar, twenty or twenty-five miles east of Dhadree, is a fall of ten feet, but on one side a rapid only, and could be cleared. From Dowlutpoor to Oonkerjee, the sides are high rocks generally, and a contracted and very rapid current running among detached rocks and islets."

The rest of this portion he speaks of as wide and navigable. Regarding the fall of forty feet at Dhadree, he considered, that even if this proved an insurmountable obstacle to a continued navigation, it might be made a place for unloading above and replacing the goods in other boats below the fall; a portage of half a mile only would be required.

It must be borne in mind, however, that these opinions were expressed upon the report of a native surveyor, who, although a man of apparent intelligence, could have had no experience, and very limited knowledge, of the means available for improving navigation. It does not appear, moreover, that he took any steps for ascertaining with accuracy the fall of the river, or making such observations as would afford grounds for deciding on the steps which would be necessary for overcoming the obstructions to be met with.

2nd. Lieut. Hore's experimental trial.

In 1840, in consequence of the repeated representations of Lieutenant Hore, Junior Assistant at Saugor, an experimental trial, † to transport coal by rafts from Hosungabad, was made on a small scale by Lieutenant Browne, Principal Assistant at Hosungabad.

* The original survey is not to be found on record. Capt. Ouseley appears only to have submitted the result of it with his opinions.

† Made between August and November, 1840.

In reporting, in November 1840, the total failure of the attempt, Capt. Browne writes as follows : " From Hosungabad to a distance of 20 or 25 miles below Hindea, the river is open during the rains ; but there, from the description of the person sent with the boat, a fall of a considerable height is met with, sufficient to stop the progress of any boat. Every inducement was held out to the boatmen to proceed further, but they flatly refused, and would not even permit their empty boat to advance without being insured the value of it."

" From enquiries made of the boatmen at Hindea, it seems that no boat has ever been known to pass this place, and it is considered by them an impossibility."

3rd. Capt. Abbott.

Captain J. Abbott, late Assistant in Nimar, whilst in charge of that district, " lost no opportunity of collecting, and noting down, all the information procurable from persons who had visited the principal obstacles." His own actual knowledge was limited to the boundaries of his district. From what this officer states in his observations upon the obstacles impeding the navigation of the river, submitted in March of the present year, it appears that from enquiries he had made, the river is navigable (except in the driest season, when it is spread over too wide a surface) from Hosungabad to within 20 miles of the Dhadree falls. That at Dhadree it is precipitated over a ledge of rocks forty feet in height, and for about 20 above this, navigation is impeded by rocks and rapids. The rest of this portion, *i. e.* from Dhadree to Mundleysir, is navigable the greater part of the year to vessels of light burden ; but during the very dry months, from the middle of March to the middle of June, the water at the rapids is too shallow to float the larger river craft.

IId Portion.

Regarding the second portion, viz., from Mundleysir to Tulluckwara, we have fuller and more satisfactory information.

1st. Lieut. Mathias' journey in 1820.

As early as 1820, Major-General Sir J. Malcolm had contemplated opening a river communication with Baroche, and with this object several officers were deputed by him to survey the course of the stream. The following extract from a Journal of a Voyage made down from Mundleysir by Lieutenant V. Mathias, of the 6th Regiment N.I., gives us our first information respecting this portion of the river :—

" Left Mundleysir on the morning of the 26th March 1820, in an open boat called a punt, made out of a single tree, about 12 feet in length, 20 inches in breadth, and drawing 18 inches water, with myself, two boatmen, and a small quantity of baggage.

" From Mundleysir to the Hirun Phall, a distance of eighty (80) miles, there is an uninterrupted navigation for small boats from the commencement of the Monsoon till the end of April, and it is then only interrupted in one place, * three miles below Muheysir, where part of the river falls down a small precipice, and a back stream is there made use of for the boats. But during the last six weeks of the hot weather, from the shallowness of the water, and the boatmen neglecting to deepen the back stream as the water decreases, it of course becomes dry ; but should it ever be required to be made use of during those six weeks, I have no doubt, from the appearance of the river, that a little labor would make it navigable all the year round.

" From the nature of the rocky bed of the Nerbudda at the Hirun Phall, I conceive it impossible that the obstacles to navigate it could ever be surmounted. from the circumstance of small ridges of rocks running parallel to each other in the river, and only distant from 12 to 20 feet, it causes such a rush of water through them, that the boatmen are afraid to pass it, being unable to guide the boat clear of the rocks ; and one which I prevailed upon the men with some difficulty to make the attempt with, was upset, and the men much bruised against the rocks. But a still greater obstacle exists about a mile below that, where nearly the whole water of the river rushes into a channel not more than forty yards broad, attended

* Luheevidara.

with a considerable fall, and with such violence, that any boat trying to pass it must inevitably be lost.

" Finding myself unable either to proceed along the bed of the river or in a boat, I determined upon getting down to Hamp Island, in the expectation that I should there be able to get boats and return by the river to the Hirun Phall, or, if not, proceed from thence to Baroche ; for which purpose I came back about three miles, and landed on the North bank of the river at the small village of Dhair, and proceeded nearly due North to Kooksee along a good cart road, distance ten miles and seven furlongs. From hence I marched in a North-west direction to Rajpoor, distance twenty-nine miles and one furlong—also a good cart road, but the last twenty miles is through a thick jungle. I then moved in a Southerly direction to Allie Mohun, through an open jungle, distance nine miles and five furlongs, till within two miles of the place, when it thickens to a deep jungle with small hills. From that to Moondlah, a distance of twelve miles in a South-west direction, through a deep moving country, in many places well cultivated by the Kressans, or Bhillala tribe, and thickly studded with large mowah trees. From this I went to Oomtee, in a Westerly direction, ten miles, through a beautiful cultivated country, thickly planted with the largest description of mowah trees ; and from hence to Hamp, in a South-east direction, by the Gore Ghaut, is ten miles and six furlongs, and is through a wild hilly and jungle country, cultivated in spots for the first five miles by the Kressans.

" Here I was much disappointed in finding myself unable to proceed in any direction, from the nature of the country and the rocky bed of the river ; and to add to my further disappointment, not a boat was to be procured, nor could I hear of one ever having been seen between the Hirun Phall and Mokree, except the punt, or small passage boat at this place, now useless from its decayed state. The bed of the river is here, when full, about two furlongs in breadth, with masses of large rocks in every direction, and the water at this time confined within a narrow deep channel from twenty to forty yards in breadth, as far as I could see from the highest hill in the neighbourhood ; and in one spot that I went to, the channel was not ten yards in width, the water rushing through it with a slight fall and tremendous force. Nothing now remained but to make my way to Mokree by the nearest route I could find ; but not being able to take my baggage through hills, I was obliged to go to Kewaunt in Guzerat, and only distant from the Gore Ghaut in a Northerly direction eight miles. From that I went to Barsnee, in a South-west direction, twenty-one miles and seven furlongs, through a highly cultivated country, thickly studded with mangoe, mowah, palmira, and other forest trees. From hence to Tulluckwara on the Nurbudda, in a South-west direction, is twenty miles and seven furlongs, through an open jungly country.

" Here I again embarked, and went up the river as far as Mokree, distance about twenty miles, and there found an insurmountable obstacle to navigation in a fall of the river which of itself is inconsiderable, but prevents the possibility of a boat ever passing it. I then returned to Tulluckwara, where I had left my baggage, from inability to take it with me from the hilly nature of the country."

2d. Major Wilson's journey.

In addition to this, and in order to establish the fact of the navigability between Mundleysir and Chiculdah beyond a doubt, Major Wilson, at Sir J. Malcolm's request,* went from the Hirun Phall to Mundleysir in the end of July 1820, " when the small quantity of rain that had fallen rendered the river uncommonly low for the season."

" The result † of the examination of this part of the river," Sir J. Malcolm writes, " was that, with the exception of the portage of Luhesvidurrah, near Muheysir, where the river, from the fall, or rather rapid, is always very difficult, and sometimes dangerous, the navigation between Mundleysir and Chiculdah was practicable for light craft nine or ten months in the year."

* In a boat which Sir J. Malcolm mentions as " a large and rather heavy passage boat."

† We obtain our knowledge of the result of Major Wilson's trip, through Sir J. Malcolm ; no Journal by Major Wilson being on record.

" At Dhurmraj, as before stated, the bed of the river is slightly contracted, but below it resumes nearly its ordinary width, the main body of the stream being in most places confined to a narrow channel somewhat resembling a canal. A little below Hirun Phall, the rocks rise on both sides in perpendicular walls, and the water is uncommonly deep, flowing for a long way with a gentle current, and without the slightest impediment. It is also worthy of remark, that in the spots already alluded to, where there are serious obstructions, the rock is but little elevated above the surface of the stream, and that for nearly the whole way from Hirun Phall to Kukranuh there is a low bank either on one side or the other, but generally on both, where a road might be constructed if necessary. The hills on either hand are pretty high, and covered with jungle.

" Kukranuh is a Bheelallee village in the Rajpoor territory, and situated on the Eastern bank of the Hatnee, about a mile from the Nurbudda.

" Here I was unfortunately compelled to abandon the idea of following the course of the river, the boatmen, from the reports they had heard of the unsettled state of the country, refusing to proceed any further without an escort to protect them. I accordingly remained at the village for three days, trying every expedient that I could think of; but although I offered a handsome reward, no one could be prevailed on to accompany me to Haump, so great was their dread of the Bheels. Finding therefore that nothing more could be done, and unwilling to incur censure by any further delay, I was forced reluctantly to make for Tulluckwara by land, intending to proceed thence by water to Baroche.

" On the 31st, I marched four coss North to Walpoor, a village belonging to Rajpoor Allee: reached Chucktollah on the 1st April, in a westerly direction eight coss, and Konah at five coss West on the 2d: on the 3d I proceeded to Barsnee, and arrived at Tulluckwara on the 4th.

" There is a garree track the whole way, having the appearance of being much used, which the natives told me was the case. In some parts it leads through a pretty thick jungle, and here and there it is hilly, but nowhere very steep, and, on the whole, it is as good a road as most of its kind.

" I was informed that there is a direct road from Walpoor to Chiculdah, and subsequently learnt that there is a shorter route from Kowant to Tulluckwara than by Barsnee; from which we may infer, that should my information prove correct, this would probably be the best line of road for establishing a land communication between Chiculdah and Tulluckwara. The distance from Kowant, through Barsnee to Tulluckwara, is about forty-one miles, and that from Walpoor to Chiculdah cannot, I think, exceed forty, so that, taking the shorter route from Kowant to Tulluckwara, and reckoning the koss at two miles, the entire length of road would be about one hundred miles; and Dhurmraj being fifty miles lower down, the distance might be still further reduced by making that the debarking point instead of Chiculdah."

From * the information gleaned by Captain Abbott, it appears that the river between Mundleysir and Chiculdah is navigable for lightly burdened boats for the greater part of the year. Below Chiculdah, he says, the stream is broken by long ledges of rock into a number of narrow channels, forming what is called the Hirun Phall, or Deer's Leap. These rocks, he further states, were described as being extremely solid, and severed by intervals of sixteen or eighteen feet.

4th. Capt. Abbott.

" A mile below this, it finds a single channel of forty yards, bounded on either side by cliffs, into which the stream, 600 yards in width, contracts in volume as it rushes down the declivity of this gorge with extreme fury."

This officer, however, after describing, from hearsay, this formidable obstacle, considers that there are reasons for believing its difficulties to be exagerated.

* This would appear to be independent of Lieutenant Anderson's.

To the information thus obtained regarding this portion of the river, through Lieutenant Mathias and Major Wilson in 1820, from Lieut. Anderson in 1841, and from Captain Abbott submitted in the present year, it may be satisfactory to append the opinion of the late Resident at Indore, Sir C. Wade.

5th. Sir C. Wade's testimony.

He writes as follows: "Having seen the obstructions of the Nurbudda in almost every part surveyed by Captain Anderson, his description of them appears to me to conform more closely to their real nature than that of any other which I have met with, excepting where he assigns a fall of eight feet at the Suhesur Durruh, near Moheysir, which does not in my opinion exceed five, and with respect to the length of the Hirun Phall fall being considerable, which did not strike me as being so. I should say it cannot exceed sixty or seventy feet, and is composed of detached masses of rock, which I am convinced would easily yield to explosion, in the hands of a scientific Engineer accustomed to the removal, by that agency, of such obstacles."

This officer concurred with Capt. Anderson in considering that the magnitude of these obstructions has been exaggerated, and recommended that the survey should be entrusted to one Engineer alone, with such assistance as might be necessary. He considered it a great mistake trusting for our knowledge of the river to partial observations made at different times and by different persons, who each had his own peculiar views on the subject.

Regarding the navigability of the stream between Tulluckwara and Baroche, there is no doubt.

IIId Portion.

Our first account is derived from Mr W. Webbe, who furnished a memorandum on this portion of the river in June 1820.

"The navigation from Baroche to Tulluckwara is not open until fifteen or twenty days after the monsoon sets in, or after the water in the Nurbudda begins to rise, which is generally about the beginning of July. It is first navigated by boats of the burden of ten kulsies or eight candies to fifty kulsies or forty candies, some laden and others not; they run up in four or five days, and sometimes in three, with a strong S. W. monsoon wind, and return heavily laden much about the same time with the current in favor. Boats of these burdens can navigate to Tullukwara until the Dewallee feast, or the month of September, after which the navigation becomes difficult, if not impracticable. Those of fifty kulsies have five men in each, and those of ten or twenty have two to four men. These draw, when heavily laden, from five to three and a half feet water; after the month of September these boats take fifteen days to go, having one or two additional hands in each, and return in six or seven days: the current and wind being then against them, they are obliged to track the boat in going up.

1st. Mr W. Webbe's Memorandum in 1820.

"After an interval of a few days, and after the Nurbudda has considerably risen, boats of a larger burden, from one hundred to one hundred and fifty kulsies (which are the largest), eighty candies or one hundred and twenty candies, leave Baroche for Tulluckwara with ten men in each. The trip up and down is performed much about the same time as those of a lesser burden; they return heavily laden, and leave this either full or empty. Boats of these burdens can only navigate until Sept., or three months at the furthest; they draw about seven or eight feet water. These boats go even as far as Deygaum Peeplia, which is about fifteen or twenty coss higher up, but not always with that facility as from Baroche to Tulluckwara, on account of the river having a rocky bed, and the current in places being very rapid: besides, there are three Ghauts to pass—Tulluckwara, (which is the most difficult,) Ukteysir, and Bhimpary. In order to get over these obstacles, the boatmen are obliged to send out long ropes from the end of their mast to be fastened to the trees on the banks of the river, and by this means draw the boat forward over the stream. This passage is performed in three or five days, and is the utmost limit

that boats have ever ventured: beyond this the navigation is said to be impracticable. Sometimes these boats in returning from Tulluckwara are interrupted in their progress at the Ghauts, which are seven in number, viz. Tatreedra, Bawapeara, Umraulee, Kundaulee, Channdode, Kenoraulee, Norendda, and Thoomdee, owing to the fall of the freshes, or by an interval of no rain for ten days or a fortnight. The boatmen are then under the necessity of lightening the boat by emptying a part of the cargo into a smaller one alongside, and filling it again after passing these Ghauts; this is done by getting a villager from the nearest place, who understands the channel. He proceeds forward on a small raft or canoe, with a long bamboo, sounding, and the boat after him.

"All boats that leave this for Tulluckwara have a sloping roof built on them with bamboos and mats, to preserve the goods from the rain; the larger ones are also built up at the sides with the same materials, to prevent the water washing in when deeply laden. These boats are built like all others that are used on this side, having no decks, with one mast, and a triangular sail.

"Boats from sixty to seventy kulsies burden can go to Tulluckwara after Sept. lightly, but cannot return heavily laden.

"The tide is felt only as far as Reennapoor, about twenty-five or thirty miles above Baroche, where it does not exceed a span in height.

"It is impossible to fix dates when the navigation of the river opens and ceases: all depends on the monsoon, and the quantity of rain that falls inland in the countries through which the Nurbudda takes its course: if it begins early, the boats of course leave this early, and the navigation continues as long as there is sufficient water for them to float up and down; the time stated above is generally the month fixed for it. Last year being a season of unusual heavy rain, the navigation was open until January 1820.

"The commodities carried from hence are salt, cocoanut, sugar, beetle-nuts, dates, both dry and fresh, brooms, cocoanut shell, hooka bottoms, earthenware, pepper, spices of all sorts, and curry stuff; and sometimes, when there is a scarcity, wheat, rice, and paddy. The returns are mowda, honey, timber, rafters, bamboos, bamboo mats, and sometimes till, ghee, and hemp.

"The above information is from some of the most intelligent merchants who have traded for thirty-five, twenty-five, and twenty, years up and down from this to Tulluckwara and Deygaum Peeplia; these men go themselves every year in their boats, and always assist the boatmen in navigating their vessels."

Further information is contained in the Journal forwarded by Lieutenant Mathias in 1820.

2d. Lieut Mathias' Journey in 1820.

"Here* I once more embarked on the 2d May, but in a larger description of boat, being nearly thirty feet in length, three and a half in width, with a flat bottom; the other that I had for my people was in every respect like an English boat, with a keel, &c. &c, and it drew two and a half feet water. The only interruption I received from this to Baroche, even at this advanced time of the year, was at the Bawapeer and Tantee Dag Ghauts, where the large boat was detained a few minutes by the shallowness of the water, so that there is an uninterrupted navigation for the largest description of boats that sail in the river as far as Peeplia, thirteen miles above Tulluckwara, during the rains, and for two months after it; but from the hilly and broken nature of the country, Tulluckwara is the highest situation up the river that could be fixed upon as a depôt, particularly as there is a good cart road from that to Chiculdah by Barsnee, Odeypoor, Rajpoor, and Cooksee, or by Barsnee, Paul Mahaul, Pansoaur, Rajpoor, and Cooksee, by that making the greatest possible distance for the land carriage to Chiculdah or Dhair one hundred and fifteen miles. But several miles would be saved by going to Loossaree, leaving Cooksee on the left hand; and again by not using the more frequented road by Oodeypoor but that of Paul Mahaul and Pansoaur, from which I have no doubt that the dis-

* At Tulluckwara.

tance of the land carriage from Tulluckwara to Chiculdah, as we become more familiar with the road, would be reduced to a hundred miles."

The following Journal of a voyage up the Nerbudda in the Honorable Company's Pattimar "Tapty," by Lieut. Elwon, Honorable Company's Marine, received in 1822, will be also interesting in this place.

3rd. Lieut Elwon, in 1822.

"Sailed from Baroche June 24th, and anchored at Jerresul, where we were obliged to remain during the following day, there not being sufficient water on the Jerresha Ghaut. On the 26th cleared the Ghaut, and passed through the Pora Ghaut without meeting with any more obstruction. In the evening anchored at Ramnapore : found the river here very narrow, with a continual strong ebb tide. On the 27th, entered the Bowapearra Ghaut, and employed warping until the evening of the 29th, when we cleared it. I am informed the freshes begin to come down about the lattter end of May, or beginning of June, and this part of the river remains navigable until the middle or latter end of September. The freshes continue seldom more than three days at a time, after which the water decreases, never leaving less than one fathom water at Bowapearra Ghaut; although it is fordable in the fair season, being dry or most water three feet, when troops often cross. This day entered the Amraully Ghaut, and employed warping during the following day, when we cleared it; and on the 1st July passed with little difficulty through the Nurkurry Ghaut, and in the afternoon anchored at the entrance of Cottarar Ghaut, there being no wind. Not being able to proceed, I returned in the bunder boat to Chaundode, one of the largest villages on the banks of the Nurbudda ; it has a very convenient landing place, with steps built of bricks and chunam, which has a very good appearance from the water. It has some trade with Brodera, carrying there timber, for which they receive cash. To Baroche they take mowa in considerable quantity, also honey and ghee, receiving in return rice, wheat, dates, and salt ; they carry up the river as far as Mokree, in small canoes called toonies, salt, native cloth, pick axes, brass dishes, and Brodera rupees, in return for which they receive bamboos, rafters and timber, which track along the bank of the river to Chaundode. The two following days employed warping through the Cotarrar Ghaut, where the bottom being hard sand and stones interspersed with rocks towards the banks, and the tide very strong, we were obliged to back the warping anchor with the boat's small anchor. On the 4th of July, while at anchor off Toomree, there being no wind, we were visited by the Jemadar, who said the country hereabouts is much infested by thieves ; he has a guard of ten sepoys. Toomree is a small village. There is excellent pasturage in the neighbourhood. I saw some good cucumber plants and Indian corn here. Wheat I understand is not cultivated at all up the river. I observed hackeries at this place, the wheels of which were superior to any of the sort I have seen in other parts of India. In the afternoon a breeze springing up, made sail. Found as we approached Tulluckwara, the tide considerably stronger, and although a pleasant breeze, were obliged to resort to the warp to gain the landing place. On 5th and 6th, employed gaining information, which was but scarce, as the people apparently knew of nothing out of Tulluckwara ; not even the Patell could tell me any thing of the surrounding country that I could at all think satisfactory.

"The following are questions answered by two matchies or pilots, at Tulluckwara :—

"*Question.* What time does the water begin to increase here ?

"*Answer.* About 1st June, when the rains commence, and then rapidly.

"*Q.* When does it become very low ?

"*A.* After the rains, or end of September, when it soon decreases, having no more than two feet and six inches water at Tulluckwara in the hot season.

"*Q.* When do the large boats come from Baroche ?

"*A.* End of July or beginning of August.

" *Q.* Are those boats larger than the Honorable Company's Pattimar Tapty ?

" *A.* No ; about the same size, or fifty candies.

" *Q.* Do they go higher than Tulluckwara ?

" *A.* No, the only boats that go above this place are small canoes or toonies."

" *July 7th,* having made the necessary preparations, Mr Zigler and self proceeded up the river in the bunder boat, with six extra hands, to assist in towing, also accompanied by the pilot in a canoe. Found the tide soon after leaving Tulluckwara so strong, we were obliged to track the boat, and this could only be done by the people wading through the water. At seven, entered the Busseean Ghaut : a few minutes afterwards observed a curious rippling in the water on the larboard bow. In passing this place close, I was surprised to find the water formed a number of whirlpools : hauled the boat close round, and on towing about ten yards found her prevented proceeding by the rapidity of the tide, and it was with difficulty the boat was kept from dropping astern. The pilot now directed she might be taken further out, as there was not sufficient water ahead : this we succeeded in by securing the boat to some chinny we were amongst, but the water was running with more force, and it required great exertion for the people to stand and save themselves from being carried away ; this would have happened in all probability had it not been for the chinny, which assisted them, and also answered to catch a turn with the boat's painter. The men exerted themselves much, and seemed determined to overcome this obstruction to our progress ; but I found, after a long trial, their endeavours were quite ineffectual, although I had twelve men on the boat's painter. I asked Mr Zigler his opinion on the spot, and as I found him the same way of thinking as myself, I determined to return, and in a few minutes we were out of this perilous situation.

" On the 10th, made a second attempt with no better success. On the 11th, as the water had risen considerably, and five hands (1¼ fathoms) water on the same parts of the sandbanks abreast of Tulluckwara, I endeavoured again to get up the bunder boat, but the tide was so strong even here (where I expected to meet with little tide from the quantity of chinny) that the boat, with sails up and eight oars out, dropped astern. It is worthy of remark, that the Gunner a short time after this, who I had forgot was not aware of the difficulties I had met with, was directed by me to proceed up the river and place flags on the North side while I went up the opposite side. He took it for granted he was to go up in the boat, to do which he had to go through the Ghaut, where, after endeavouring about two hours he was not a little surprised to find himself obliged to return. The Basseean Ghaut is nearly a mile from Tulluckwara, and has a stony and rocky bottom ; the water runs with such rapidity that I have no hesitation in saying it is impossible for a boat to overcome it at this time of the year, and had I been able to have got through, I still never should have dreamt of reporting it navigable after the difficulties I met with.

" From this time I commenced the survey of the river downwards. Tulluckwara stands close to the river side on the top of the high bank : the landing-place, at the South-east side of the town, has a steep ascent, very difficult to surmount in wet weather ; the fort has but three sides, being open to the water side. There are one hundred and fifty infantry and fifty cavalry residing within the walls ; the remaining ryots live outside. There is only one boat belonging to Tulluckwara, which is for passengers. The Patell (Boman) informed me there are not more than fifteen hackeries in Tulluckwara, and that in the finest time of the year they cannot go up higher than Gurneysur, which is said to be only three coss from Tulluckwara. I was also informed the freshes rise sometimes to an extraordinary height ; that they never remain there more than nine days, when the water decreases, leaving not more than eight hands water (two fathoms) at Tulluckwara. I was not able to get any information respecting the roads between this and Mhow.

" After meeting with many difficulties from the freshes, which often carried away our flags, and caused great detention, we reached Bundarea on the 24th

and were compelled to remain three days by the freshes. On the 27th, I was informed of the arrival of the Rajah of Naundode at Jawur, a village close to where the vessel was at anchor. I shall merely say I paid my respects to him. On the 1st of August, anchored abreast of Chaundode, many of our people on the sick list, principally through fatigue. Questions answered by the merchants of Chaundode :—

" *Q.* Do you trade to Mokree and above?

" *A.* Yes.

" *Q.* When does the trade commence between Chaundode and Mokree?

" *A.* In November (Cartig mina), and lasts until the end of February or beginning of March.

" *Q.* What articles do you carry there?

" *A.* Cloth, salt, and spices.

" *Q.* What do you bring away?

" *A.* From Dunneer, (above Mokree,) spars about eighteen feet long (fit for boats' masts,) and from Mokree, rafters and bamboos.

" *Q.* What places above Mokree have your boats been at?

" *A.* With distances from each other.

Southern side of the river.	Soolpan, 3 miles above Mokree.	Rajpeplia.
	Dankerrah, 3 ditto above Soolpan.	
	Shemokeree, 3 ditto above Dankerrah.	In the Bheel country, Parwee Raja Ker Dunnee.
	Warmong, 3 ditto above Shemokeree.	
	Dunneer, 3 ditto above Warmong.	
North side of the river.	Wargaum, opposite Mokree.	Rajpeplia.
	Guddur, 4¼ miles above Wargaum.	

" *Q.* What description of boat can go up to Mokree?

" *A.* Toonies drawing two hands water (three feet,) when loaded can go up as far as I have ever traded (to Dunneer.)

" *Q.* How do you get your boats up from Chaundode to Mokree?

" *A.* Tracked up; the sails are of little use then, the wind being mostly down the river.

" *Q.* How many men do you put in your boats then?

" *A.* Eight, ten, and twelve.

" *Q.* Does the water run with great force then?

" *A.* Equally as strong as in the month of July—six, seven, and eight, miles an hour.

" *Q.* How much water in Chaundode Ghaut in the dry season?

" *A.* Three hands (¾ fathom.)

" *Q.* How do you get your boats up the Mokree fall?

" *A.* They are emptied of their contents, and then hauled up the fall.

" *Q.* How many men are necessary to get the boats up the fall?

" *A.* Twenty.

" *Q.* How far have they to go before they can be re-loaded?

" *A.* From eight hundred to a thousand feet.

" *Q.* How is your merchandize transported that distance?

" *A.* On men's heads.

" *Q.* Have they any hackeries at Mokree?

" *A.* No; the country is too mountainous.

"*Q.* Can men be procured about Mokree to assist you with your boats?

"*A.* Plenty, at three and four annas per day.

"*Q.* What water at commencement of the fall?

"*A.* Two hands (three feet), and above Mokree fall 4, 5, 6, 8, 10 and 12 hands, (as much as three fathoms.)

"*Q.* How do you act coming back over the Mokree fall?

"*A.* Empty the boats at the fall, and as there is not then sufficient water to float the boats for about four or five hundred feet, they are launched along a smooth bed of stones, which are very slippery, being covered with a grassy substance, and they are guided down the fall with little trouble, when, the boats being re-loaded, proceed with ease to Chaundode in two and three days.

"*Q.* Have you ever seen or heard of boats in great danger of being lost going up the fall?

"*A.* No.

"*Q.* Can boats go up above Dunneer?

"*A.* Yes.

"*Q.* Why is trade not carried on above that place?

"*A.* Because of the thieves, who would not pay above half the price they would bargain to give for what we carry.

"I have measured one of the boats at Chaundode employed in the trade to Mokree and above. Her length twenty-two feet, breadth four feet ten inches, depth two feet, her bottom quite flat.

"*August 20th.* Reached Linnore. Learnt there is a trade to Mokree and above: their cargoes are carried to Chaundode in large boats, when they are put into the toonies and proceed as afore-mentioned.

"*August 25th.* Entered the Bowapearra Ghaut, where we met with much difficulty from a heavy fresh and unfavorable wind. On September 1st, we reached Ramnapore, since which time we got on pretty well, until the fresh commenced, which compelled us to return to Baroche."

4th. Lieut. Anderson in 1842.

Lieutenant Anderson (the report of whose journey between Mundleysir and Tulluckwara has already been given,) concludes the account of his trip as follows:

"I embarked at Tulluckwara on the morning of the 5th, and arrived at Baroche on the 7th, having performed the entire journey from Mundleysir in twelve days, not including the delays at Chiculdah and Kukranuh, and I am convinced that I should have accomplished it in less time had I been permitted to proceed altogether by water."

The following extract from the report drawn up by Captain Dangerfield, and to be found in Appendix II. of Malcolm's Central India, gives some valuable and interesting information regarding the bed and vicinity of the Nerbudda, and may well find a place here:—

Extract from Capt. Dangerfield's Report on the Geology, &c. of Central India. Vide Appendix II. Malcolm's Central India.

"The banks of the Nerbudda for a considerable distance between Mundleysir and Chiculdah are from forty to seventy feet high, and consist, independent of a thin upper layer of rich vegetable mould, of two distinct strata of alluvium; the upper, which is very light coloured, contains a great quantity of indurated marl, and is strongly impregnated with muriate of soda or common salt, which the natives extract by lixiviation, and subsequent evaporation by the sun, in shallow compartments near the banks, and sell it to the poorer classes, particularly the Bheels, in the neighbourhood. This stratum is usually from thirty to forty feet thick.

"The one on which it reposes, and from which it is divided by a strongly-marked horizontal line, and a difference of colour, (this last being of a redder hue,)

contains a very large proportion of carbonate of soda in general, but slightly contaminated by the muriate. This bed rarely exceeds ten or fifteen feet thick, and rests immediately on the basalt forming the bed of the river. In the dry season, both these salts form a thick efflorescence on the surface of the bank, and this alone is collected by the natives. That from the lower bed forms an article of export for the use of the washermen, &c. &c.; but the soda itself is not extracted like the common salt, nor is its value but in the above way known.

* * * * * *

"The bed of the Nerbudda, consisting, as already remarked, for a considerable portion of its course of basaltic rocks, gives rise to numerous shallows and small falls. Of these, the three principal are, one at Deyree, where the river is much contracted; a second at Semadarah, a little below Mhysir; and a third at the Hurn Phal, or Deer's Leap, below Chiculdah: whence, till its entrance into Guzerat, the stream finds its way contracted to within half its usual breadth between two hilly ranges, and its course being much impeded, so as to render navigation impracticable, by large masses and elevated ridges of the rock.

"Passing higher up the stream from Mundleysir, the Northern bank, after about thirty miles, becomes rocky and precipitous, and consists of gently inclined beds, chiefly of greenstone slate, containing interposed mica in small grains. But the island of Mundatta and part of the opposite bank appear mostly to consist of hornstone slate of a reddish or greenish grey, and sometimes porphyritic. Above this for a considerable distance is, on each bank, a very wild woody tract, resembling that already noticed below Chiculdah, excepting that the river is in general deep, and less obstructed by rocks.

"This part consists of a succession of low hills and deep ravines and watercourses, is covered with high thick forests, and is scarcely capable of being travelled in most parts for seven or eight miles from the river by any but foot passengers. Iron ore abounds; but the country being almost desolate, it is only smelted at Kantcole and Chandgurh, for the supply of the Indore and neighbouring markets. It is of a good quality, but from the imperfect mode of working, the metal is little valued, excepting for common purposes. The hilly tract below Chiculdah is better populated, chiefly by wild Bheel tribes; and nearer Broach on the Southern bank are the Rajpeeply hills, inhabited by the Coolie tribe. In these hills are situated the several cornelian mines, of which a concise account has been given by Doctor Copland, in the first volume of the Bombay Literary Transactions. From Burwaee to Chiculdah, the whole valley, from the Satpoora to the Vindhya mountains, is nearly level, well watered, cultivated, and inhabited."

Supplement to Note on the Navigation of the Nerbudda River.

To make the Note more complete, a few extracts have been made from a paper on the Nerbudda river, by Lieutenant E. P. Del'Hoste, 16th Regiment N. I., to be found in the Volume of Transactions of the Bombay Geographical Society from 1836 to 1838.

Vide Note at the end.

The information afforded by Lieutenant Del'Hoste, although procured by him in 1829, will best find a place here, as it relates only to the portion of the stream between Soolpan and Tulluckwara. This officer informs us that he left Tulluckwara in April 1829, with the intention of following the course of the river towards its source as far as he could. He got as far as Soolpan,* at which point he writes, that "the stream of the river, from being from 60 to 100 "yards broad, suddenly narrows to about 60 feet, and on each side is hemmed "in with steep precipices; the middle of the river is also studded with large "rocks, and the stream, even at this season, rushes through the intervals with "surprising rapidity, dashing large pieces of wood which were floating down,

[Of Portion II.] 6. Lieut. Del'Hoste in 1829.

* Vide Transactions of the Bombay Geographical Society, from 1836 to 1838, No. VI., p. 174.

" from one side to the other, with a force which no boat could have withstood; " neither indeed would it be possible to steer a boat in such a rapid current " through such a tortuous and narrow channel. Both banks are precipitous and " covered with thick jungle, and all further progress is rendered impossible."

Regarding the stream at Mokree Ghaut, where he descended into the bed of river, he says, " At this place there is a ridge of rocks stretching completely across the " river, which is nearly one hundred yards broad, causing a fall of about 12 feet " in height. I took the opportunity of bathing in the river, the water of which " was perfectly clear. The force of the current was such as to compel me to " hold on by the large rocks, of which the river is full below the fall; the bed was " covered with large round pebbles, rendering it difficult to walk."

At the village of Goragaum (about 5½ miles below Mokree,) he says " that the " course of the river appeared impeded by rocks, through which the stream passed " with a continued gurgling sound, that could be heard at a considerable distance."

At Gurreysir, distant 6 miles from Tulluckwara on the right bank, he crossed the stream in a good sized boat, and writes as follows regarding this part of the river: " Beyond (*i. e.* above) this village, the river appeared full of large rocks, " the passage for the water between which was barely three or four feet; the total " breadth was 80 yards at this point, and the depth of the water where I crossed (in " the centre of the stream) 18 feet, measured with a pole; the right bank was low, " level, and slightly covered with jungle. * * * The left bank, on the contrary, " was precipitous and rugged towards the river, but towards the South numerous " ranges of hills covered with jungle were visible. These hills form the end of " what is called the Sutpūri range. I may add, that as far as Soolpan the features " of the country were similar."

Between Gurreysir and Tulluckwara, " the road lay over a level and well " cultivated tract of black soil. The course of the river was visible the whole " distance, and offered no impediments whatever to navigation; the depth ascer- " tained from the guides varied from twelve to fourteen feet."

A. SHAKESPEAR,
Assist. Secy. to Govt. N. W. P.

ART. VI.—*Report by the Commander, Indus Flotilla, of an Experimental Voyage up the Indus and Sutledge, made by the "Meanee," steam-tender to the Pendant-ship "Mootnee," with the "Ravee" iron flat in tow, having* 1600 *maunds of Merchandize on board: with Diary.* By Lieut. W. CHRISTOPHER, I. N., 1st Assistant, Indus Flotilla.

[Presented by Government.]

JUNE 19TH, 1847.—Left Sukkur at sunrise. The Flat draws two feet eight inches: her draft has formerly been three feet with troops &c., when being towed up from Kotree to Sukkur, in the low season. The "*Meanee*" has three months' stores, and draws forward two feet six inches, aft two feet nine inches. The flat lashed alongside of the steamer, as the vessels are said by the Officer in charge to steer better so, and are less liable to accidents. Made slow progress the first four hours, the current running three to four miles an hour, and in turnings of the river stronger. Jungle for fuel abundant. The banks of the river two to four feet high. The river is generally one thousand two hundred yards

broad: the deep channel five hundred yards in breadth, and from two to seven fathoms depth. Made twenty miles to-day. After leaving the neighbourhood of Sukkur, there were few signs of population along the banks: the scattered villages seen were unknown to the pilot.

20*th June*.—Started early. Burnt coal to get up to Sadooja, five coss, (ten miles,) where the Sukkur moonshee was ordered to place fuel: none was found. Proceeded until 1.30, and made fast at Chuchera, to procure fuel from a deserted village, having come eighteen miles. The right bank had four villages, the left bank not one. The only part of the river where jungle fit for fuel was observed, was at Saragi village, on the right bank, three miles above Sadooja wood station: the banks of the river from two to four feet elevation. The entrance of the Bigurry Canal is marked by a very large tree, and is four miles above Saragi village.

21*st June*.—After a detention at this place, for fuel, eight and a half steaming hours, proceeded at 8.30. Current very strong in places. Passed a large village named Daraee, eleven miles above Chuchera, at 10 A. M. Good jungle near, on right bank. Passed Juffet Shah N. A. Tanda, at fifteen miles, on left bank; at nineteen miles, Jaghwanee and Bindee villages, at twenty-three miles, both on left bank. Stopt to wood at Wahidna Chuchera at 5.30 P. M. Made twenty-nine miles from starting. Paid for the wood, as the village was inhabited. The people sold us the raised sleeping-places, or platforms, which are uniformly erected in front of every hut in Sindh, and seem of the first necessity to health and comfort. They are from ten to twelve feet above the ground, and the whole family are seen on them towards sunset. Lost another hour and a half by stopping for wood. The banks of the river from two to four feet in height.

Wahidna Chuchera.

22*nd June*.—Started at five, but a rush of current round a point stopped the vessels' progress: tried to pass up on the other side of channel, and in every part, but dropped astern. This being the first time the vessel has been unable to proceed, from the currents, lashed the flat astern and tried to steam up. The eddies made the vessels twist about in so violent a manner that they were in danger of dashing alongside each other. After some risk being incurred, and the officer in charge having no confidence in the management of the vessels, so secured astern of each other, made fast and secured the flat alongside again. The engines made thirty-two revolutions throughout the day, and by the log-book on the passage up from Kotree last month, without a flat in tow, the engines made thirty-four and thirty-five revolutions, so that

the loss of speed by the flat being attached, does not by this criterion appear much. The current I estimated at seven miles an hour. Men were obtained to track her past the point, and a line got ready (or hawser.) After two or three failures, owing to the vessel swerving round against the helm, steadily steered up to the point, and passed on without the assistance of tracking. The detention in passing this point was seven and a half hours. Steady steerage is of the greatest importance on the river in overcoming a current. Made nineteen miles, and reached Gabla village at 6.20 P. M. on right bank. This is in every respect a good depôt for fuel. It is a very old village, having a deep creek leading to it, and a high bank with fuel jungle near at hand above and below.

23*rd June.*—Started at 4.35 A. M., and made good way to Bootah, on right bank: found fuel here placed by the Sukkur moonshee. It was three hundred yards away, and the detention was five steaming hours in taking it on board: such villagers as could be got were employed to save time. There is good jungle here. Made nine miles against a strong current, and secured to the bank thirteen miles from Kushmore.

24*th June.*—At 5 A. M. started: the current very strong. Reached Kushmore at 2 P. M. Found fuel placed here by the Sukkur moonshee, instead of below at Sadooja. Cast off from this at 5.50, but could not make progress: the vessel not answering her helm, made fast again—lost an hour and a half in consequence.

25*th June.*—Left at 5, and made good way for seven or eight miles, when the river became contracted in its bed to six hundred yards, and rushed down eight miles an hour. Crossed and re-crossed, but could not pass up, and after two hours sent lines on shore. Drift wood coming down, made the pilot say the river was rising. In warping past this part of the river seven and a half hours were occupied, but the distance was not more than two-thousand yards. The vessel twice sheared off the bank, breaking lines, and went down stream several hundred yards before she would answer her helm. These vexatious accidents cost us much time and labor: other steamers have found the channel bad at this place. Made nine and a half miles. Secured the vessels to a bank. It blew fresh at night—a squall with rain from the westward, and a short swell, soon got up, giving a great deal of motion to the vessels and forcing them against the bank violently; the squall was over in half an hour, and the swell as quickly subsided. From the strength of current and wind combined, extra anchors could not have been carried out.

26th June.—Started early and made six miles in two hours, and then could not make head over the current. Tracked and steamed for one hour, about five hundred yards, and went to Bharra station. Were detained wooding three and a half hours, though fourteen natives were employed to assist in bringing wood down. Sent a chuprassee on by land to have two hundred maunds down at the beach of next station. This is a well-selected depôt: there is good jungle a few miles down on the right bank. Entered Koondree Creek, and made seventeen miles in four hours. There is nine feet throughout the Creek: it winds amongst cotton-fields and every sign of a thickly populated country: much jungle on the island.

27th June.—Made four miles an hour against the current of two and a half miles, and arrived at Bhoong at 11.18. There is jungle here on both banks: the stream about two miles broad. The Koondree creek is about twenty-six miles long, and safe at this season for a steamer. We found the northern entrance with less water than the southern: there was nine feet throughout. Had tracking lines out for half an hour, and then went ahead again over the stream. Wooded in two hours at Bhoong station, and went up a creek for eight miles, and re-entered the main stream. A sand squall threatening from eastward, anchored in the channel and kept the engines working. Weighed in half an hour, but could make no progress: stood back for a quarter of a mile, and anchored for the night.

28th June.—Weighed early, and after trying to steam past for two hours, commenced tracking up the right bank. A north-east breeze freshening, endangered the paddle-wheel: called the men on board, and tried to steam on the shallow side of the channel, without success. Returned to former anchorage and sent for wood, when the breeze fell. At five got steam up and tried again, without success.

29th June.—Wood came down during the night. Started early and tried to get the vessels ahead by long warps to steady them and assist steerage in shallow water, but, from the strength of the current and eddies, the vessels turned round, carrying away or breaking the warps, and in ten minutes all the ground gained by the labor of hours was lost by the vessels not answering their helms.

30th June.—Though very desirous of not injuring the Merchandize, I sent yesterday for boats, determined to attempt a shallow creek, as the river is fast rising and we might warp her through, but the strength of the current, and narrowness of the creek, rendered the vessels unmanageable; throwing them aground, first on one side, and then on the other:

when aground, banks were formed rapidly between and about them. Returned to the former anchorage.

1*st July*.—The river having fallen three inches during the night, tried to steam past again, without success. After working some hours the usual squall threatened from the N. Eastward, and the vessels were taken back to an anchorage.

2*nd July*.—Put out a fourth of *Ravee's* cargo, and received in *Meanee* eight or nine hours' fuel only. The river had fallen during the night four inches. For two hours and a half made no progress under steam, so had recourse to tracking, and in three hours having tracked and steamed two thousand yards (without the formerly recurring accidents of swerving off from the bank with the vessels' head down stream) went on by steam alone easily to Muluk, over a current of four knots. Lightening the flat seemed of very little use: the vessels did not certainly perform better under steam only, and nothing but unremitting attention to the helm, when warping and steaming up, carried the vessels past this strong part of the river's course. I estimated the breadth here at five hundred yards, having an average depth of twelve feet. Fuel jungle on right bank. Had the vessels answered their helm when in five or six feet of water, we could have come past easily the first day. They both draw less than three feet, and yet, from some cause, are quite unmanageable in a depth of five or six feet of water. The merchandize was taken on board again. The Mullukwallee wood station is at a bank of old formation, at the entrance of the Jumallee creek, and a good position.

3*rd July*.—Entered the Jumallee creek at the embouchure. The depth is four feet, width one hundred yards. Several fisheries stretched across. Proceeded up against a two knot current, but at 11.10, owing to the vessels not answering their helms, grounded badly at the junction of another creek with the Jumallee: were detained in heaving off two hours and twenty-five minutes, and proceeded. Had light rain and wind from the N.E. in the evening.

4*th July*.—Proceeded. The creek very winding: current one to two miles an hour. Shoaled suddenly from five to two feet, and grounded on a clay-knoll in a narrow part of the creek: were detained by grounding three hours fifty minutes; and fuel being expended, waited for the chuprassee who had been sent to the next station to come down. Sent up and down to near villages for fuel: were detained eight hours and ten minutes for fuel this day.

5th July.—Reached Assampore wood station, having been twelve and three quarter hours steaming through the Jumallee creek, making thirty-seven miles. Proceeded up the old bed of the river: made at sunset, twenty-three miles from Hussanpore, and secured. Creek shallow at places. Jungle adapted for fuel is plentiful about three to five miles from the river (on the left bank.)

6th July.—Had to send out warps to track ahead on entering the main stream of the river. Reached Chachera at nine, having made five to six miles this morning. Proceeded, after receiving wood and a small quantity of the best coal, and made nine miles up the Chenab. Four of the Punjaub rivers flow in one stream, and join the Indus or Attock river at Chachera, which is on the left bank and opposite to the large town and fort of Mittenkote, from which place the Indus rolls diminishing towards the sea.

7th July.—Proceeding up the Chenab: made thirty-nine miles, taking advantage of creeks. Fuel jungle on right bank.

8th July.—Started with a strong S. W. wind, and, taking advantage of creeks, made thirty-four miles. Secured at Tibber Buckree, one mile below the junction of the Sutledge with the Chenab. A large shikargah of bawn and kalli wood, belonging to Bawul Khan, fifteen miles long, extends from ten miles below the embouchure of the Sutledge to the southward, which will afford fuel for many years.

9th July.—Entered the Sutledge river, which contributes a pale muddy colored water to the Chenab: the latter has a reddish appearance. The waters of the Sutledge as they join the Chenab are thus easily distinguished. The body of water in the Chenab is so much greater that the Sutledge hardly creates any disturbance, but as it were steals along the bank, not extending one-sixth of the distance over the red waters pouring down from the junction of the three streams* Chenab, Jelum, and Ravee. The Channel of the Sutledge at its junction is one hundred and fifty yards broad and twelve feet deep: current of three miles an hour. The Ravee's breadth is eight hundred to one thousand yards: current four miles an hour. The exact channel of the Ravee could not be distinguished. The country is well populated hereabouts, and fuel jungle abundant. The banks of the river have an elevation of three to five feet generally, there being no signs of rock or any soil but alluvial from this point (the junction of the Sutledge) to Sukkur. Made nineteen miles to-day.

* The names Chenab and Ravee are given to the continuation of the four streams as they flow united to the Indus.

10*th July*.—Made three miles, and used the Chachera coal, but could not keep steam up with it: anchored. Fuel having been sent for yesterday sent up another man: detained ten hours do-day for want of fuel.

11*th July*.—No boat of fuel having come, dropped down two miles and got seventy maunds of wood from villages. At 3.40, after ten hours detention for fuel, proceeded, and made seven and a half miles against the current.

12*th July*.—Reached Mahomedpoor to-day after much labour warping against a fresh of the river: warped and steamed one thousand yards, and went on by steam alone. Four hours were occupied in warping, the hawsers being brought to the windlass: made eight and a half miles.

13*th July*.—Made good progress with the S. W. wind for three hours, when, in rounding a point or angle of the river, the vessel, going full power, was taken by an eddy and dashed stern on to the bank: the engines were stopped and reversed, or an attempt at reversing made, but, the vessel having headway, without effect. The helm was useless. Both vessels struck the bank violently. A swag of old timber entered the *Meanee's* post-bow, and as the current swept her past, the stern was somewhat bent. Finding the vessel filling, secured to the bank in slack water, and repaired the damage effectually. The whole of the lower plate was torn from the stern, and an opening of fourteen inches in extent made. Proceeded at 4.20, having been detained nine hours. The vessel, quite light, reached Moowallee wood station, ten miles above Mahomedpoor.

14*th July*.—The river here has changed its bed this season, the natives assure me within the last fifteen days, and the greatest body of water passes now four miles to the westward, so that as a depôt for wood this site is useless for the low season. Made good way until in passing a point the steamer was turned violently round by an eddy, and the flat was forced on the bank. No damage occurred to her, and the steamer's paddle-wheel was saved. Had the flat not been secured abreast, the wheel must have been seriously damaged. Increased experience with our present vessels will render accidents less frequent, but unremitting attention is most essentially necessary. Came ten miles, and was stopped by shallow water, two and a half to three feet being found all across the river.

15*th July*.—This day commenced warping over a shoal bank of loose sand having two to three feet water. The opinion of the officer in charge of the steamer was, that a channel would not form for a week at this place, but a deep channel was evidently cutting away. Three large native

boats came up under sail this afternoon, and could not pass. With much labour warped against a strong current six hundred yards, frequently losing ground from anchors dragging and warps breaking.

16*th July*.—Continued warping ahead all day: gained one thousand six hundred yards. The channel still unformed; the vessel in her own depth of water, or an inch or two more or less. The three native boats made sail, steered over the bank, and passed on to Buhawulpoor: they were deeply laden, and drew nearly three feet of water.

17*th July*.—To-day being in four feet of water, steam was got up, and an attempt made to go on by steam: the vessel sheered about from one side to the other, and dropped down by the current one mile. An anchor was let go, but it did not check her. Warped again with the heaviest anchors and chains.

18*th July*.—Warped clear, and steamed ahead one mile, in seven to eight feet of water, and was again stopped by shallow water. After three hours' warping got into a former channel and anchored.

19*th July*.—Secured off Buhawulpoor, on the right bank, one mile from the ghat.

20*th July*.—Examined and cleaned the boilers and engines.

21*st July*.—Left Buhawulpoor at 10 A. M. Made fourteen miles to-day. Peer Ibrahim Khan, Assistant Agent at Buhawulpoor, assures me that five hundred maunds of fuel are placed at stations sixteen miles apart, according to Captain Powell's request, and that the supply has been ready a long time—the wood must therefore be dry. The ferry at Buhawulpoor being on a line of intercourse with Moultan and Khorassan, yields three thousand rupees a year, the contractor paying that sum to Government—half to Moultan and half to Buhawulpoor. I could not hear of any probability of a cargo down from this to Scinde or Bombay. The Kardar of the Moultan district informed me that he had received orders to render the steamer every possible assistance, and was very attentive. The Moultan province is well cultivated. We stopped at a contracted part of the river where the vessel would not steer, and was in great danger, being turned violently round against the helm, and but just cleared the bank with reverse engines. Secured for the night at the large village of Mombaruckpoor. It is difficult to describe the unmanageable state of a vessel when swerving round by the current: it is so rapid a motion that in a narrow part of the river as this was, nothing but the greatest attention and promptitude saved her from serious injury.

22nd July.—Steamed past the bad part of the river assisted by a S.W. wind. On arriving at the first wood station from Buhawulpoor, instead of five hundred maunds only one hundred were produced by the peon in charge. I was again assured that there was a larger quantity at the upper stations, and that the river had taken away some of the supply laid in at this place: detained three hours. From Buhawulpoor twenty-seven and a half miles: made this distance in one day's steaming. During the afternoon of to-day had to use tracking lines for three hours to warp ahead.

23rd July.—Received attention from the Moultan Kardar, who had fuel and stock ready at each station. Made twenty miles to-day. By water twenty-six and a half miles from last station to this—Noor Mahomed. The steamer excites great astonishment, and sometimes much dread. The Moultan Kardar very obsequious and attentive.

24th July.—Made twenty-three and a half miles to-day. Distance between fuel depôts twenty-one miles by water.

25th July.—Made thirty and a half miles to-day; but from having taken the wrong channel, returned six and a half miles, and lost three and a half steaming hours.

26th July.—Could not hear of any fords: the river is said to be constantly changing; the sand is very loose. Distance between wood stations twenty-seven and a half miles: the same deficiency is found in the quantity of fuel, one hundred and seventy maunds being delivered instead of the five hundred that were ordered.

27th July.—Lost one hour and twenty minutes to-day by grounding: made fifteen and a half miles. The Moultan Kardars very attentive.

28th July.—Entered a narrow channel which has been formed during the last fifteen days; the channel of the river last year being four miles eastward, and now blocked up or very shallow. This day, from the vessels not steering in five and six feet water, could make no progress after 12 o'clock: much time is thus lost. The vessels steer for ten or fifteen minutes, and then swerve round against helm with violence: anchors are let go to check them, but much distance is lost. In a cross current they are unmanageable, when there is shoal water edging the channel on either side, and no bank for tracking.

29th July.—In passing up this narrow place, though during the night the river had risen eight inches, the channel was very bad, and the current turned the vessels violently round and threw them on a

bank. The anchor was let go, but they swerved with such force that it would not check them. Hove off and proceeded at 9 A. M. Current strong and channel intricate. Made eight and a half miles to Seydoo depôt.

30th July.—The engineer reported the port plumber-block of the engine broken: an iron band was put round, and after a detention of three hours twenty minutes, proceeded up—warped for three hours. There is much extra trouble from the vessels swerving off, breaking the warps, and being carried down by the current. The wedge bow of the *Meanee* is much against her in progress, when meeting a cross current. Some rain fell in showers at a short distance from the vessels.

31st July.—Vessel turned violently at a narrow part of the river where a new channel is forming: the officer in charge said he thought after six or seven days the vessels might go on. The vessels were taken up the old channel with a local pilot on board, and were fortunate enough to pass into the main stream without grounding, having three feet water only where the channel was being blocked up. Fuel was bad and steam could not be kept up: warps were constantly carried out for six hours, aided with all the steam the fuel would generate. Made nineteen and a half miles.

1st August.—To-day made little or no progress, being obliged to track ahead: with full power the steam when well up would not carry the vessel over the current. At 2 P. M., having made only two miles and a half, and the fuel being all expended, made fast and waited,—fuel having been sent for since yesterday. The bank of the river being for half a mile nearly straight, measured exactly several hundred yards; and by throwing a log overboard, and making signals three several times, the current was found to be running at the rate of four miles seven furlongs per hour, the progress of the vessel being about four knots per hour with the flat in tow alongside: this is much inferior speed to what the officers on board estimated the vessel's speed at, but the method of trying was accurate. A vessel going six knots an hour would have come up over the current of the Sutledge as far as this.

2nd August.—Went on by steam, a S.W. wind assisting the vessel. Made six miles, but after 12 o'clock could make no progress, the channel being in the centre, and shoal water extending out from either bank, so tracking was impossible.

3rd August.—Made half a mile against the current with a fair wind;

but from the same cause as yesterday, made no progress when the wind fell, as tracking was impossible. The river fell ten inches to-day.

4th August.—Lashed the flat astern, but it is more difficult to steer steady. The flat sheers off the vessel's quarters on either side. The vessels steamed ahead easily to a bend of the river, off the point of which the cross current made the *Meanee* sheer broad off. The flat's helm was instantly put over, but the vessels came together head and stern, and the towing beam was broken: having a spare one, fitted it and tried all day to take the vessels on, but after repeatedly grounding and carrying out anchors for ten hours, secured the vessels five hundred yards below the place we started from in the morning,—the flat being injured by the bumpkin of the *Meanee*, and the *Meanee* more slightly damaged by the stern of the *Ravee*. The vessels astern of each other will not steer in six feet of water when going full power with a strong current, and would not go ahead in the centre of the stream.

5th August.—Secured the flat alongside the steamer, and steered close along the bank: with hawsers on shore warping ahead, made half a mile. Sent for boats to lighten the flat.

6th August.—Put into boats half the flat's lading, as the 15th of this month is the date mentioned in my orders as the latest date to quit Ferozepoor for the vessels' speedy return. Towards evening secured to the right bank, four hundred yards below the place started from The steamer has not power to take up the flat against the current with only eight hundred maunds weight on board.

7th August.—Started at 11.15, being detained for fuel; but not making any headway, out hawsers and warped ahead for three hours, and then went steadily on, gaining three miles during the day. The agents of the Nawab of Moultan evinced the utmost readiness in attending to all our demands, and payment was made in proportion to services performed. This was a part of the river that had two shoal banks, where tracking was for some distance at this season impossible.

8th August.—With a strong S. W. wind made four miles by steam, and then was obliged to track for four hours after receiving more fuel: could make no way without lines on shore.

9th August.—We have been seven days coming fourteen miles. It is now evident that the instructions cannot be carried out in respect to quitting Ferozepoor on or before the 15th of this month, and it remains an important question what ought to be done. My orders are explicit to

go to Ferozepoor with the *Ravee* in tow, but it is now past all hope getting there with the *Ravee* in tow before the current slackens and the river falls: under these circumstances, I should return at once, but my duty evidently is to carry out my orders as far as possible. If not able to tow the flat up, still the steamer as well as the flat are ordered up, and the steamer can go alone, leaving the flat at some convenient place.

10*th August.*—An extensive open forest extends through this district towards Moultan at distances from the river's bank of from two to fifteen miles, which affords abundance of fuel. The vessels in passing the entrance of a creek or small branch of the river, were set into it by the current, and for a short time were fixed across the entrance with the tide forcing them on: the rudders were a good deal strained: the vessels were detained three and a half hours for fuel, and lost time by warps breaking, &c. &c.

11*th August.*—Were nine hours tracking and steaming two thousand and five hundred yards, from vessels taking broad sheers and swerving against the helm.

12*th August.*—Jungle is not seen from the bank of the Sutledge at this part, but there is said to be abundance of fuel three and four miles from the bank, though the trees are low. Arrived at Pank Puttun ferry at five o'clock: made arrangements, in accordance with the correspondence appended by me with the agent for Jehangeer's house, to put the remainder of the cargo, with the exception of a few cases, into country boats, and proceed on in the steamer with a few valuable cases to Ferozepoor.

13*th August.*—Procured boats and transferred the remaining cargo. Pank Puttun town is a place of pilgrimage, not of commerce.

14*th August.*—Reported to Commander Powell proceedings. The vessel without the flat does not in some places stem the current in the centre of the stream. Made fourteen miles direct from starting place in nine hours.

15*th August.*—A large piece of forest seen to-day, thirty miles above Pank Puttun, at Hussinpen village. To-day we passed two places where there was only three to four feet water all across the bed of the river: the channel, altering from one bank to the other, washes the sand across the old bed of the river, and time is required for a deep channel to be cut away in the new direction the waters take. Came to a depôt for wood quite flooded: the natives say the river has risen eighteen inches the last two days, and yet we have only four feet water in some places of the river. With no deeper channel the vessel without a tow goes ahead over

the current at half power, and steers better in the shoal water. River falling.

16*th August.*—In a narrow part of the river where the current was stronger than usual, the vessel swerved off against her helm, and the helm was ordered to be shifted to let the vessel turn quite round and clear the bank towards which she was running; but not turning quick enough, the port wheel took the bank. When the vessel's head was down stream the speed of the vessel must have been nine miles an hour over the ground. When this unfortunately happened, the engines were stopt, but the vessel had not lost her way: the wheel was bent a good deal, and six floats split to pieces; one rivet of the boss broken; the wheel stopt the vessel for the time. The *Meanee*, though very slightly built, is of the very best material. After this accident, as the state of the port wheel prevented the engines being turned ahead, anchors were let go for the night and lines sent to the bank.

17*th August.*—Had two places of only three to four feet water all across, the channel changing from the old bed. At one point in the river an island divided the stream into two channels. The vessel was taken up the old one: its communication with the main channel at the upper part of the island was narrowed to twenty feet in breadth and eighteen feet in depth. The bank of sand which formed one side of the channel had only two feet water on it. The steamer was warped through, the sand washing from under her as she moved ahead. Passed the first raft of timber yet met with.

17*th August.*—Passed the ruined fort of Nimrod. The channel very wide and shallow. Vessel makes good progress—thirty-three miles to-day, and the river rising.

18*th August.*—In some places the vessel hardly gained over the current, particularly near Molunkee village, where the river is contracted. Made fast to the bank opposite Ferozepoor fort at 4.50, having been 51.15 under steam from Pank Puttun to Ferozepoor. The distance in a direct line is seventy-five and a half miles,—by the river one-hundred and fifty-five miles; which gives an average of three miles an hour against the current at this season.

Principal causes of failure.

This experiment, then, must be considered to be a failure from want of power in the vessel to tow a flat of equal size and immersion against the current in the flood season.

In some places a deficiency in depth of water was experienced, but these were below Bahawulpoor.

Had the vessel steered in her own depth of water—as the old construction vessels do,—the strength of the current might nearly have been evaded, and the vessels taken up in comparatively slack water. This fault in the steerage was also the cause of all the damage sustained, or danger incurred, to the vessels on their way up.

Though the only damage sustained proceeded from a defect in the steerage, another serious source of danger is the sudden and violent storms of wind and dust to which the Sutledge is perhaps more liable than the Indus. When one of these squalls is observed approaching, I would advise the vessel being secured safely ere it strikes her, for, if it prove slight, the delay is trifling, and if severe, the atmosphere is so darkened you may injure the vessel. In this trip we experienced during two months only one squall that might have done mischief.

Squalls on the Sutledge.

The Journal comprises every subject to which you specifically directed my attention. First the channel of the river: this is an unsatisfactory part of it, for in some places the river divides into so many streams that a statement of the channel the vessel is in seldom gives a correct account of the volume of water passing down to the Indus. I hesitated to specify where the river passed down in one stream, as the entrances and embouchures of canals and creeks could not always be seen, from the river spreading out in places two or three miles in width. The channel of the main stream was always found to be loose shifting sand the same as below, but no pebbles were ever seen, the bank being uniformly of mud, never exceeding eight feet in height. No hill or rock of any kind was found on the whole course of the Sutlej up to Ferozepoor.

Channel of river.

Nature of channel.

Banks.

Ferries are noted. The natives made a mystery of fordable places in the low season: I think it is very probable that wherever there is a ford in the low season there will be a ferry established in the high. All the ferries, as before said, are noted.

Ferries.

The best places for depôts of fuel are forwarded on a separate list, but from the sudden changes the river is liable to, constant care will be necessary to watch the course the waters take, and have the fuel at an accessible point. There is jungle for fuel in sufficient abundance near to the Sutlej, though not bordering on its banks in most places, but situated some distance back.

Fuel depôts.

Taking as a criterion the passage of the *Meanee* steamer from above Pank puttun—where the flat was left—to Ferozepoor, the vessel would have arrived from Sukkur at Buhawulpoor on the thirteenth day, and at Ferozepoor on the twenty-seventh, allowing two hours daily for fueling &c.

Rate of Progress of steamer.

(Signed) W. CHRISTOPHER, *Senior Lieutenant, I. N.,*
1st Assistant Indus Flotilla.

(True Copy) (Signed) F. T. POWELL, *Commander, I. N.,*
Commanding Indus Flotilla.

(True Copy) (Signed) E. J. BROWN,
Assistant Secretary to Government of Scinde.

Hon'ble Company's Steam

Diary of an Experimental Voyage up

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
6.00	9.30	1 0	3 4	...	...	...	...	56.7	J	18	500
9.30	12.00	1 0	3 6	...	...	...	...	36.7	J	16	500
12.00	7.00	2 0	13 0	...	...	...	...	2.7	J	17	500
7.00	12,00	2 0	14 0	...	...	...	...	264	J	17	450
12.00	1.30	2 0	3 0	5½	...	...	...	2 to 7	C	18	500
1.30	7.00	...	...	...	...	...	...	...	...	...	...
8 30	12.00	...	0 4	3	...	3½	...	4	G	18	450
12.00	1.00	1 4	1 4	...	...	...	...	4	J	30	350
1.00	4.05	1 4	4 4	3	...	...	...	5	B	22	400
12.00	1.00	3 0	3 0	7	...	...	...	4	B	42	200
1.00	2.00	3 4	3 4	1	...	...	...	3	J	42	250
2.00	3.00	3 4	3 4	...	...	...	...	5	B	22	450
3.00	4.00	3 4	3 4	...	...	...	...	4	J	22	500
4.00	5.00	3 0	3 0	...	...	...	...	7	B	22	500
5.00	7.00	2 4	5 0	...	...	...	...	5	B	24	300
7.00	8.00	3 0	3 0	...	...	...	...	1 to 5	J	21	300
8.00	1.00	...	...	5½	...	...	...	...	...	...	...
1·00	4.00	1 2	3 6	...	...	...	...	1 to 5	C	30	250
4.00	5.00	2 2	2 2	...	...	...	...	1 to 4	B	24	300
5.00	7.00	1 4	5 0	...	...	...	...	1 to 4	B	24	350
5.00	6.00	2 0	2 0	...	...	...	...	1 to 6	J	23	300
6.00	7.00	1 4	1 4	...	...	...	...	2 to 7	B	21	100
7.00	9.00	1 6	3 4	...	...	...	...	2 to 5	B	15	700
9.00	11.00	1 4	3 0	...	...	...	...	2 to 6	J	21	450
11.00	1.00	1 4	3 0	...	...	...	...	1 to 7	B	20	250
1.00	2.30	1 4	2 2	...	...	...	...	1.40	B	18	700
2.30	7.00	...	...	2	...	2½	...	1.40	C	18	500
5.00	5.30	3 0	1 4	...	...	...	...	2 to 7	B	16	500
5.30	7.35	2 0	4 0	...	...	...	...	2 to 7	B	16	500
7.35	9.10	...	...	...	...	...	...	2 to 7	J	18	300
9.10	3.45	...	1 0	...	...	...	6.35	1 to 5	J	18	300
3.45	7.00	0 4	2 0	...	...	...	...	2 to 7	B	12	500
5.15	11.00	1 6	6 0	...	...	...	1	2 to 7	B	15	700
11.00	2.30	...	...	3	...	...	...	5	D	16	600
2.30	7.00	3 4	17 4	...	...	...	...	2 to 6	D	6 to 9	80
5.00	9.10	2 6	11 0	...	...	...	...	1 to 5	J	5 to 9	70 to 100
9.10	11.15	0 6	2 0	...	...	...	...	2 to 7	J	12	500
11.15	1.30	...	...	2¼	...	...	...	...	...	...	...
1.30	3.00	3 0	4 4	...	...	...	...	2 to 7	J	12	5
3.00	7.00	4 2	1 0	...	...	...	...	4 to 8	J	12	800
5.00	12.00	...	...	...	...	7	...	3	J	12	500

Tender "Meanee."

the Indus and Sutlej in June, 1847.

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks. In the preceding columns, R. means right Bank. L. „ le t Bank. C. „ Cultivation. J. „ Jungle for fuel. B. „ Brush wood.
				June 19th.—The spread of water ex-
3.0	....	...	88°	tends in places for four miles in
2.4	....	...	94	width. The channel is as noted.
2.0	....	...	94	June 20th.—Good fuel jungle three
2.0	Sadooja.	...	94	miles above Soodaja station and
2.0	Chachera.	...	98	cotton cultivation. Fuel was not laid
...	....	...	...	in as ordered, had to burn coal.
4.0	....	...	97	June 21st.—Vessels not steering stea-
2.4	Juffer Khan.	...	97	dily, and making no progress, lash-
2.4	Bhendy.	...	96	ed the flat astern, but could not tow
				her in that position, vessels not steer-
				ing.
2 to 5	L. Khan.	...	97	June 22nd.
2 to 4	....	...	...	
...	....	...	...	
2 to 4	....	...	98	
2 to 5	R. Gobla.	...	...	This village is very old, has a fort, and
2 to 5	....	...	85	there is good jungle in the immediate
2 to 5	....	...	...	neighbourhood for fuel. 23rd June.
...	Bootah.	...	...	Well-grown jungle near at hand.
2 to 5	Khye Badamice.	...	95	
2 to 5	....	...	...	
2 to 5	....	...	97	
2 to 4	....	...	84	24th June.
2 to 7	.. ..	...	...	
2 to 6	....	...	...	River-drift floating in large quantities.
2 to 6	....	...	94	
2 to 6	....	...	...	Passed several hillocks on river bank,
2 to 5	Kushmore. R... ...	...	...	twenty to forty feet high.
2 to 5	....	...	95	Sand-squall from the west.
2 to 6	....	...	87	25th June.—Large quantities of drift
2 to 6	Alleya. R.	...	...	coming down the stream. Warping
5 to 6	....	...	...	ahead for seven or eight hours.
5 to 6	....	...	95	
3 to 5	Dadalput.	...	...	Squally, with light rain from ahead.
3 to 5	R. Bushka.	...	84	26th June.
3 to 5	R. Bhaina.	...	100	
1 to 2	Many Villages and	...	83	Cotton cultivation on all sides.
1 to 2	much cultivation.	...	84	27th June.—Plenty of jungle all about
3 to 5	Bhoong.	...	97	this station. The whole spread of
...	Ditto	...	100	water here is two miles across.
2 to 6	... .	...	98	
3 to 5	... .	...	90	
5 to 6	... .	...	...	28th June.—Being detained here four

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
7.00	8.00	3 0	3 0	...	...	...	...	...	J	12	200
8.00	12.00	3 4	14 0	...	...	...	...	...	B	12	300
12 00	2.00	2 4	5 0	...	...	...	...	...	B	12	200
2.00	4.00	3 0	6 0	...	...	...	...	..	J	12	400
4.00	5.00	2 4	2 4	...	...	...	...	4	B	18	300
5.00	7.30	2 0	5 0	...	...	...	...	4	B	16	300
4.30	8.00	3 0	10 4	1	...	...	...	2 to 6	J	30	500
8.00	9.00	3 0	3 0	...	...	...	...	...	J	12	200
9.00	10.00	2 4	2 4	...	...	...	...	1 to 5	J	12	200
10.00	11.00	2 4	2 4	...	...	...	...	...	J	12	400
11.00	12.00	3 0	3 0	...	...	...	...	...	J	12	500
12.00	4.00	2 6	11 0	...	...	...	...	...	...	18	500
4.08	5.00	3 0	3 0	...	...	...	...	...	...	12	500
5.00	6.00	2 4	2 4	...	...	...	...	...	...	18	100
6.00	7.00	2 4	2 4	...	...	...	...	...	...	18	300
4.00	5.00	2 4	2 4	...	...	...	...	3	J	18	700 to
5.00	6.00	2 4	2 4	...	...	...	...	3	C	18	800
6.00	9.10	2 0	6 2	...	...	...	..	1 to 5	C	12	150
9.10	10.40	...	...	...	1½	...	...	3	C	10	300
10.40	3.00	1 4	6 4	...	...	...	...	1 to 7	C	9	400
3.00	4.00	1 4	1 4	...	...	...	...	2 to 6	B	12	300
4.00	6.00	1 4	3 0	...	...	...	...	...	...	9	300
5.00	7.00	2 4	2 4	...	...	...	...	3 to 5	C	8	500
5.00	8.30	1 0	3 4	...	...	...	...	2 to 3	C	5 to 12	300
8.30	7.00	...	...	10½	...	...	...	2	B	9	300
5.00	12.00	...	...	7	...	...	...	...	...	...	...
12.00	4.00	...	...	4	...	...	...	...	...	...	...
4.00	7.00	1 2	3 6	...	...	...	...	2 to 5	B	9	250
6.30	9.30	0 4	1 4	1½	...	...	...	1 to 4	B	12	300
9.30	10.30	0 4	0 4	...	...	...	...	...	B	12	300
10.30	2.30	0 2	1 0	...	...	...	4	...	B	18	200
2.30	4.30	0 6	1 4	...	...	...	...	...	B	12	400
4.50	6.50	2 0	4 6	...	...	...	...	6	C	15	400
4.40	6.30	0 4	2 0	...	...	...	...	4	B	18	300
6.30	12.00	...	...	...	5.50	...	...	3	B	12	400
12.00	4.25	...	...	...	4.25	...	...	3	B	12	400
4.25	7.00	2 4	7 0	...	...	...	...	1 to 5	C	9	500
4.40	5.00	2 4	1 0	...	...	...	...	1 to 5	J	18	300
5.00	6.25	...	...	1.25	...	...	...	...	J	...	...
6.25	12.00	1 0	5 4	...	...	...	...	1 to 7	B	12	480

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
				days it was a good opportunity to calculate the body of water passing down the channel of the Indus at this season and place. It was found to be 165,000 cubic feet per second. This is, however, but an approximation, and creeks drain off a good deal joining below.
...	....	...	...	
4 to 6	....	...	86°to	29th June.—Had the vessels steered in
4 to 6	....	...	100	six feet of water they would have passed up, the current being slack
4 to 6	....	...	85	30th June. [in that depth.
4 to 6	....	...	101	
4 to 6	....	...	86	1st July.
4 to 6	....	...	103	
				2nd July.
4 to 6	....	...	99	
4 to 6	....	...	102	After 4 hours warping in a 5 to 6 knots
3 to 6	....	...	...	current, got into slacker water.
3 to 6	Mulluknate.	...	...	
3 to 5	....	...	...	
2 to 3	Jumallee.	...	...	3rd July in a creek detained by fisheries.
...	....	...	86	Grounded at a sharp angle, the creek
2 to 3	....	Ferry.	102	narrow. Thickly populated.
1 to 3	Dahumkhan.	...	92	4th July.
...	....	...	97	A clay knoll.
...	....	...	90	
				5th July.
1 to 3	L. Kollapore.	...	88	Creek winding.
1 to 3	L. Doulutpore.	...	...	Proceeding up the old bed of the river,
...	L. Ahabadpore.	...	...	only filled in the flood season. Jungle
...	L. Hussanpore.	...	...	five miles from the bank.
...	....	...	...	
...	....	...	...	
...	L. Hussan Khan.	...	...	Entered Chachura Creek.
...	L. Rahimon.	...	...	
...	L. Khodabuksh.	...	...	
...	L. Rakinpore.....	...	...	
...	....	...	...	
1 to 4	....	...	86	6th July.
...	....	...	87	Entered another creek.
...	L. Chachera.	Ferry.	...	Mittenkote opposite on the right bank.
3 to 5	....	...	99	
...	....	...	101	
2 to 5	L. Goodpore.	...	96	Thickly populated.
				7th July.
1 to 2	....	...	82	Proceeding up the Chenab river or
1 to 2	R. Nassolla.	...	...	Gharsa.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
7.00	8.00	3 0	3 0	...	...	...	...	...	J	12	200
8.00	12.00	3 4	14 0	...	...	...	...	...	B	12	300
12 00	2.00	2 4	5 0	...	...	...	...	...	B	12	200
2.00	4.00	3 0	6 0	...	...	...	...	..	J	12	400
4.00	5.00	2 4	2 4	...	...	...	...	4	B	18	300
5.00	7.30	2 0	5 0	...	...	...	...	4	B	16	300
4.30	8.00	3 0	10 4	1	...	...	...	2 to 6	J	30	500
8.00	9.00	3 0	3 0	...	...	...	...	...	J	12	200
9.00	10.00	2 4	2 4	...	...	...	...	1 to 5	J	12	200
10.00	11.00	2 4	2 4	...	...	...	...	...	J	12	400
11.00	12.00	3 0	3 0	...	...	...	...	...	J	12	500
12.00	4.00	2 6	11 0	...	...	...	...	...	...	18	500
4.08	5.00	3 0	3 0	...	...	...	...	...	...	12	500
5.00	6.00	2 4	2 4	...	...	...	...	...	...	18	100
6.00	7.00	2 4	2 4	...	...	...	...	...	...	18	300
4.00	5.00	2 4	2 4	...	...	...	...	3	J	18	700 to
5.00	6.00	2 4	2 4	...	...	...	...	3	C	18	800
6.00	9.10	2 0	6 2	...	...	...	..	1 to 5	C	12	150
9.10	10.40	...	...	...	1½	...	...	3	C	10	300
10.40	3.00	1 4	6 4	...	...	...	...	1 to 7	C	9	400
3.00	4.00	1 4	1 4	...	...	...	...	2 to 6	B	12	300
4.00	6.00	1 4	3 0	...	...	...	...	...	...	9	300
5.00	7.00	2 4	2 4	...	...	...	...	3 to 5	C	8	500
5.00	8.30	1 0	3 4	...	...	...	...	2 to 3	C	5 to 12	300
8.30	7.00	...	...	10½	...	...	...	2	B	9	300
5.00	12.00	...	...	7	...	...	...	...	...	...	...
12.00	4.00	...	...	4	...	...	...	...	...	...	...
4.00	7.00	1 2	3 6	...	...	...	...	2 to 5	B	9	250
6.30	9.30	0 4	1 4	1⅓	...	...	...	1 to 4	B	12	300
9.30	10.30	0 4	0 4	...	...	...	...	...	B	12	300
10.30	2.30	0 2	1 0	...	...	...	4	...	B	18	200
2.30	4.30	0 6	1 4	...	...	...	...	...	B	12	400
4.50	6.50	2 0	4 6	...	...	...	...	6	C	15	400
4.40	6.30	0 4	2 0	...	...	...	...	4	B	18	300
6.30	12.00	...	...	...	5.50	...	...	3	B	12	400
12.00	4.25	...	...	...	4.25	...	...	3	B	12	400
4.25	7.00	2 4	7 0	...	...	...	...	1 to 5	C	9	500
4.40	5.00	2 4	1 0	...	...	...	...	1 to 5	J	18	300
5.00	6.25	...	...	1.25	...	...	...	...	J	...	...
6.25	12.00	1 0	5 4	...	...	...	...	1 to 7	B	12	480

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
...	R. Kulburdina.....	...	...	
1 to 2	R. Pereira.	...	97°	
...	....	...	104	
...	R. Dillygol.	...	100	Large jungle on right bank.
2 to 3	R. Maldur.	...	...	
2 to 3	....	...	...	8th July.
3 to 6	R. Koodpeene.....	...	81	Entered a creek. Were detained for wood; good jungle for fuel.
...	L. Tibbee.	...	98	
2	L. Lall Chaddy.	...	...	The S. W. Moonsoon asssisted us to day.
2	L. Melangby.	...	...	
1 to 2	L. Mirwallee.....	...	106	On left bank good jungle for fuel.
1 to 3	R. Mittoo.	...	...	
1 to 2	....	...	104	
1 to 2	.. ..	...	...	Entered a creek.
1 to 2	To Bukree.	...	...	
				9th July.
1 to 2	....	...	86	Channel not discernible at the junction
3 to 4	R. Dammer.	...	...	of the Sutledge and Chenab.
2 to 4	Aucherpoor.	...	...	Entered Sutledge, one sixth the size of
3	R. Lungalai.	...	...	the Chenab, or Gora, or Ravee, into
2 to 4	....	...	98	which it falls.
2 to 4	....	...	102	About this place there was a a ford in
2 to 5	....	...	...	the low season of 1845-46.
2 to 3	Chine.	Ferry.	98	Between the large towns of Ahmedpoor and Jillapore.
2 to 4	....	...	85	10th July.—Passed over one part of the
3½	....	...	...	river having five feet water; across, seven hundred yards broad.
...	....	...	...	11th July.—Detained for fuel; sent back
...	....	...	100	to village one mile for some.
2 to 3	....	...	98	
	L. Jungua.	...	...	12th July.—Received a boat-load of
4 to 5	....	...	84	fuel.
4 to 5	....	...	...	Had the vessel steered in six feet water,
4 to 6	....	...	...	could have gone ahead over the cur-
3 to 5	....	...	102	rent in that depth: the eddies sheer the vessels off the bank, and cause delay.
4 to 6	Mahomedpore.	...	97	July 13th.—By not answering helm in
2 to 3	....	...	85	an eddy, stove the *Meanee's* bow in,
3	....	..	...	on striking the bank; but had the
3	....	...	...	vessels answered their helms this could
2 to 5	L. Moradpoor.	...	...	not have happened.
				14th July.
1 to 3	Noherwallee.	...	84	
...	....	...	97	
2 to 5	....	...	106	In passing a contracted part, vessel

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
12.00	6.00	1 2	7 4	...	...	...	...	3	B	10	400
6.00	7.00	...	...	...	1	...	...	3	B	12	400
8.00	12.00	...	...	...	...	...	4	3	B	3	800
12.00	7.00	...	...	...	...	...	7	3	B	3	800
6.00	12.00	0 2	1 4	...	6	...	...	3	B	3	800
12.00	7.00	...	...	...	...	7	...	3	B	3	800
6.00	12.00	...	0 4	...	...	6	...	2	B	3 to 6	600
12.00	6.00	...	0 4	...	...	6	...	2	B	...	...
6.00	12.00	0 2	3 0	..	...	...	3	2	B	2½ to 6	600
12.00	7.30	0 2	1 7	...	4	...	4	2	B	...	...
5.00	8.25	1 0	3 3	...	....	...	...	3	C	6	200 to 500
...	...	...	...	...	...	...	...	5	C	12	500
9.00	10.00	1 4	1 4	...	..	...	...	3	B	10	450
10.00	12.00	2 4	5 0	...	...	...	...	3	B	9 to 18	400
12.00	1.00	...	...	...	...	...	...	4	B	18	150
1.00	2.00	2 4	2 4	...	...	...	...	3	B	9	250
2.00	3.00	2 0	2 0	...	...	...	...	3	B	12	250
3.00	5.00	1 6	3 4	...	...	...	...	4	B	8	500
5.00	7.00	1 2	1 2	...	...	...	...	5	B	8	500
6.00	9.00	2 0	6 0	...	...	...	...	4 to 8	B	12 to 48	400
9.00	10.30	2 0	3 0	...	...	...	...	5	B	12	400
10.30	1.30	...	...	3	...	...	...	4	B	12	400
1.30	3.00	1 4	2 2	...	...	..	...	3	B	10	500
3.00	6.00	1 0	3 0	...	...	...	3	3	...	10	250
6.00	7.00	1 0	1 0	...	...	...	1	2	...	12	400
5.00	6.00	2 0	2 0	...	...	...	...	3	B	15	600
6.00	8.00	1 0	2 0	...	...	...	...	4	J	15	600
8.00	11.00	3 0	9 0	...	...	...	...	3	B	15	600
11.00	2.00	...	...	3	...	...	...	3	B	15	600
2.00	5.00	3 0	9 0	...	...	...	...	4	B	18	450
5.00	7.00	1 4	1 0	...	...	...	...	3	B	18	500

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	....	...	...	swerved against her helm and endangered the flat, which struck the bank violently at 6: grounded in two feet.
2 to 4	....	...	96°	
2	....	...	99	15th July.—Heaving ahead in the vessels' depth—a few inches at times more, at times less.
2	....	...	...	
2	Fotehbuddie.	Ferry.	97	16th July.—Ditto. Attempted to steer ahead in four to six feet, but went back eight hundred yards.
2	....	...	...	
3	Chim.	...	...	17th July.—Stove ahead in four feet against the current, and regained the ground lost yesterday by attempting to steam, and warped half a mile further.
3	....	...	97	
3	....	...	87	18th July.—A great part of to-day warping ahead in the vessels' own draft of water: a new channel forming, the old one blocking up. Had the vessels steered in from four to six feet the detention would have been much less.
3	....	...	98	
3	Bahawulpore.....	Ferry.	97	19th July.—Bahawulpore at 3.25 A. M. The channel has changed, and the steamer cannot go to Bahawulpore Ghat, but is secured on the Moultan side in twelve feet of water.
4	....	...	...	20th July.—Remained at Bahawulpore.
3	L. Gongah.	...	86	
2	L. Bukkurpore.	...	...	Channel very intricate.
				21st July.
4 to 5	....	...	98	Current strong.
2 to 3	R. Rotta.	...	...	
2 to 3	L. Godpore.	...	...	
2 to 3	....	...	...	
2 to 4	....	...	87	Drifted one mile down river, from vessels not answering their helm.
				22nd July.—The channel is two hundred and fifty yards wide, and there is forty-eight feet of depth here; a deep rut from the setting in of current against the bank of small extent.
2 to 4	Mombaruckpore R.	...	...	
2 to 4	Nawalpoor L.....	...	...	
2 to 5	L. Cassim Thale.	Ferry.	92	
2 to 5	....	...	...	
4 to 5	Gooldera L.	...	...	Heaving ahead with hawsers.
4 to 5	....	...	...	
3 to 4	Honddijok R.....	...	...	23rd July.
3 to 4	....	...	...	
2 to 3	Mungwance L.	Ferry.	...	A few date trees and large baubool and blackwood clumps of trees.
2 to 3	Ins. R.	...	...	
1 to 3	Lall Tuharrie L.	Ferry.	...	
3 to 5	Keror R.	...	...	The last hour made little progress.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
5.00	8.00	...	...	3	...	...	...	3	B	18	500
8.00	11 00	2 4	7 4	...	...	...	...	2	...	15	470
11.00	12.00	3 0	3 0	...	...	...	...	4	J	15	500
12.00	1.00	3 0	3 0	...	...	...	...	5	J	15	500
1.00	2.00	1 0	1 0	...	...	...	...	4	B	18	300
2.00	4.00	3 0	6 0	...	...	...	...	3	B	9	400
4.00	6.00	2 4	5 0	...	...	...	...	2	B	9	300
6.00	7.00	2 0	2 0	...	...	...	...	4	C	9	300
6.00	8.00	3 4	7 0	...	...	...	...	3	B	9	250
8.00	10.00	...	...	...	...	...	...	3	C	6	200
10.00	11.00	3 0	3 0	...	...	...	...	4	J	7	250
11.00	12.00	2 4	2 4	...	...	...	...	3	J	4½	150
12.00	4.00	2 1	8 4	...	...	...	...	3	J	8	450
4.00	6.00	2 0	4 0	...	...	...	...	2	C	3	400
4.30	6.00	...	...	1½	...	...	...	3	C	6	450
6.00	10.00	1 4	6 0	1½	...	...	...	2	B	4 to 9	400
10.00	12.00	2 0	4 0	...	...	...	...	3	J	12	450
12.00	3.00	1 0	3 0	...	...	...	...	4	B	8	425
3.00	4 00	2 0	2 0	...	...	...	...	3	B	12	300
3.00	4.00	2 0	2 0	...	...	...	...	3	B	12	300
4.00	5.00	2 0	2 0	...	...	...	...	5	B	12	150
5.00	6.00	1 0	1 0	...	...	...	...	3	B	12	300
5.10	6.10	1 0	1 0	...	...	...	...	5	B	12	400
6.10	7.15	...	...	1¼	...	...	...	4	B	12	...
7.15	8.10	2 0	1 6	...	...	...	...	3	B	12	...
8.10	9.30	...	...	...	1.20	...	...	4	J	2 feet	...
9.30	10.10	1 4	1 0	...	...	...	...	4	B	9	...
10.10	11.20	...	...	1.10	...	...	...	2	B	12	200
11.20	12.00	1 4	1 0	...	...	...	...	5	B	18	150
12.00	4.10	2 0	8 0	...	...	...	...	3	J	15	200
4.10	5.10	...	...	...	...	1.10	...	4	B	12	200
5.10	7.30	2 4	6 0	..	...	...	...	..	...	...	...
4.50	6.10	1 4	2 2	...	...	...	...	5	B	12	150
6.10	7.25	...	..	1.25	...	...	...	4	C	12	150
7.25	9.50	2 2	5 4	...	...	...	...	3	B	12	150
9.50	11.05	...	...	1¼	...	...	...	3	B	12	150
11.05	12 00	1 4	1 3	...	...	...	...	4	B	12	600
12.00	1.00	1 0	1 0	...	...	...	...	2	B	6	100
1.00	7.00	...	...	...	...	6	...	2	B	5 to 6	801
6.00	7.00	0 4	0 4	...	...	...	...	2	B	5 to 6	80
7.00	8.00	...	...	1	1	...	...	2	B	5 to 6	80
8.00	10.00	1 0	2 0	...	...	...	...	3	B	6 to 7	100
10.00	11.00	1 0	1 0	...	...	...	...	2	B	5 to 7	180
11.00	12.00	1 0	1 0	...	...	...	...	3	B	7 to 9	300

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Noor Mahomed.	Ferry.	...	24th July.
1 to 3	Insuf-ka-gote L.	...	...	
1 to 2	Poor Mahomed.	...	...	
1 to 2	Laboo.	Ferry.	...	A good site for a fuel depot ; jungle
2 to 4	Several small	...	...	near, and the water deep.
1 to 2	villages.	...	...	
...	....	...	...	A grove of date trees.
2 to 3	....	...	...	25th July.
1 to 2	....	...	...	
1 to 2	....	...	...	Wrong channel.
1 to 2	....	...	...	Fueling jungle four miles distant.
2 to 3	....	...	...	
1 to 3	Khyrpore R.	Ferry.	...	A good depot ; high bank, and jungle
1 to 3	....	...	...	near.
				26th July.
3	Doopore.	...	...	S. W. wind of great assistance.
2 to 4	....	...	...	
2 to 3	....	...	...	
2 to 3	Sudpoor } L.....	Ferry.	...	Channel very intricate. Two years ago
2 to 5	Chullanee }	...	...	the river was fordable here in the
2 to 5	....	...	...	low season.
2 to 5	....	...	...	
3 to 5	....	...	...	
3 to 4	.. ..	...	...	27th July.
...	Mardpoor R.	Ferry.	...	S. W. wind of great assistance.
2 to 4	....	...	...	
3	....	...	...	Aground from not steering : good fueling
2 to 4	....	...	...	jungle.
4 to 5	Rhaimrail L.	Ferry.	...	The river fordable here (it is said) in
3 to 4	....	...	...	the low season.
2 to 5	Alliwal L.	...	...	Jungle on both banks.
2 to 5	....	...	...	A squall of sand at N. E. Furled awn-
...	....	...	...	ings &c.
				28th July.
3 to 5	....	...	...	S. West wind, and cloudy.
3	Moglah R.	Ferry.	...	
2 to 6	....	...	...	Went up a new channel four miles west-
3	Kughi L.	...	...	ward ; a former bed of the river, and
3 to 4	....	...	...	very recently formed. River divided
2 to 5	....	...	...	into many channels and cross currents.
3	....	...	...	Made no progress, from not answering
				her helm.
3.4	....	...	...	29th July.
5.4	....	...	...	
3 to 4	Meraka L.	Ferry.	...	Channel intricate.
3 to 4	....	...	...	
3 to 5	....	...	...	

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
12.00	4.00	1 4	6 0	...	...	...	2.0	8	B	12	300
4.00	5.00	0 4	0 4	...	...	...	0.4	3	B	15	250
4.55	6.20	1 0	1 4	...	...	...	...	4	B	12	400
6.20	10.00	...	...	...	...	...	...	...	...	...	...
10.00	12.00	1 2	2 4	...	...	...	...	3	B	10	320
12.00	4.00	0 2	1 0	...	...	...	4	3	B	12	300
4.00	5.00	2 0	4 0	...	...	...	...	2	B	12	300
6.00	7.00	1 4	1 4	...	...	...	...	1	B	10	300
6.00	8.00	2 2	4 4	...	...	...	...	3	B	9	300
7.00	8.00	2 0	2 0	...	...	...	...	3	B	9	150
8.00	9.00	0 2	0 2	1	...	...	...	3	B	...	...
9.00	10.00	2 0	2 0	...	...	...	...	3	C	9	300
10·00	11.00	1 4	1 4	...	...	...	...	2	C	9	500
11.00	12.00	2 0	2 0	...	...	...	...	2	B	12	200
12.00	3.00	2 0	6 0	...	...	...	...	3	J	15	300
5.00	9.00	...	...	...	...	...	...	4	B	9	500
9.00	10.00	0 4	0 4	...	...	...	1	3	B	9	500
10.00	11.00	0 4	0 4	...	...	...	1	3	B	9	500
11.00	12.00	1 0	1 0	...	...	...	1	2	C	9	500
12.00	2.15	0 4	1 2	...	...	...	2¼	3	C	9	500
2.15	7.00	...	...	4¾	...	...	...	2	C	9	500
5.20	7.00	1 4	2 0	...	...	...	...	3	C	12	450
7.00	12.00	0 6	3 6	1	...	...	1½	3	B	9	500
12.00	5.15	0 4	2 5	...	...	...	5.18	2	B	12	500
5.11	7.00	...	...	...	1¾	...	...	2	B	10	500
5.00	8.00	0 2	0 6	...	...	...	...	3	C	12	450
8.00	10.50	...	...	2.50	...	...	...	3	C	12	450
10.10	12.00	0 4	0 6	...	...	...	1.10	3	C	12	450
12.00	2.30	...	...	...	...	...	...	3	B	12	500
2.30	7.00	...	...	...	...	...	...	6	C	12	500
5.15	12.00	...	...	...	...	6.45	...	3 to 6	C	12	500
12.00	2.35	...	...	...	...	2.35	...	...	C	12	500
2.35	7.00	...	..	...	...	3.25	...	...	C	12	500
5.00	10.50	...	...	...	...	...	...	3	C	12	500
10.50	12.00	0 2	0 3	...	...	...	1.10	3	B	10	500
12.00	6.00	0 1	0 6	...	1	...	4	...	...	10	500
5.00	12.00	...	...	...	...	...	...	3	B	10	500
12.00	1.55	...	...	1.55	...	...	...	3	B	10	500
1.55	6.00	...	...	...	...	...	...	3	B	9	500
5.00	11.45	...	...	6 to 5	...	...	...	3	B	12	500
11.45	12.00	...	...	...	...	...	¼	3	B	15	400
12.00	6.00	0 4	3 0	...	...	...	3	3	B	17	300
5.00	9.55	...	...	2.55	...	...	...	3	B	10	450

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Hydoo R.	...	...	Full steam, and hawsers out.
3 to 5	....	...	...	
				30th July.
2 to 5	....	...	...	
...	....	...	...	Repairing engine.
3 to 4	Kowrah R.	...	...	
4 to 5	....	...	...	Warping and steaming.
2 to 3	....	...	...	
2 to 4	....	...	...	
				31st July.
2 to 5	....	...	...	
2 to 5	... .	...	...	
...	Sakkoke R.	Ferry.	...	A rich country.
...	....	...	...	
...	....	...	...	
...	....	...	...	
2 to 3	....	...	...	Good fuel jungle.
4 to 5	....	...	...	1st August, 1847.—*No progress.*
4 to 5	....	...	...	Tracking and steaming.
4 to 5	....	...	...	ditto ditto
4 to 5	....	...	...	ditto ditto
3 to 5	....	...	...	ditto ditto
3 to 5	....	...	...	Tried current: found it 4.7 per hour.
				2nd August.
3 to 5	....	...	...	
3 to 5	Mharree L.	...	...	Tracking and steaming nearly all day,
3 to 5	....	...	...	wherever there was a steep bank.
4 to 5	....	...	...	
				3rd August.
4 to 5	Mahtoo R.	Ferry.	...	
4 to 5	....	...	...	Could not make way, there being no
4 to 5	....	...	...	steep bank for line; and secured the
4 to 5	....	...	...	flat astern.
4 to 5	....	...	...	4th August.—Trying all day to make
4 to 5	....	Ferry.	...	progress with flat astern, but from
4 to 5	....	...	...	the vessels not steering, lost ground.
4 to 5	....	...	...	
4	Maptoo.	Ferry.	...	5th August.
4 to 5	....	...	...	Lashed flat alongside.
..	....	...	...	Warping and steaming; fuel bad.
4 to 5	....	...	...	6th August.—Discharged into country
4 to 5	....	...	...	boats half the cargo. Made no pro-
4 to 5	....	...	...	gress: the vessels will not steer in six
4 to 5	....	...	...	feet water, and in deeper water the
				current is strong.
4 to 5	....	...	...	7th August.—Cutting fuel. Vessels
4 to 5	....	...	...	steered better in six and seven feet,
4 to 5	....	...	...	and passed up.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
7.55	11.00	1 0	3 1	...	...	...	...	3	B	12	450
11.00	12.00	0 2	0 2	...	...	...	1	2	B	12	450
12.00	2.15	...	...	2¼	...	...	...	2	C	12	300
2.15	6.00	0 2	1 1	...	...	...	2	2	J	10	350
5.30	8.00	0 6	1 7	...	...	...	4	3	B	6 to 17	300
8.00	9.45	...	...	1¾	...	...	...	2	B	12	300
9.45	12.00	1 4	1 0	...	1.10	...	...	3	B	12	300
12.00	7.00	0 6	5 2	...	...	...	3	2	B	12	300
5.00	7.00	0 2	0 4	...	...	...	2	2	B	12	350
7.15	10.35	...	...	3.20	...	...	...	2	B	10	350
10.35	12.00	1 0	1 4	...	...	...	...	2	B	11	350
12.00	1.15	1 0	1 1	...	...	...	...	3	B	12	300
1.15	2.10	...	...	1	...	...	...	3	B	12	300
2.10	4.55	2 4	6 2	...	...	...	...	3	B	12	300
4.55	7.00	...	...	2.05	...	...	...	3	B	12	300
5.00	6.00	1 4	1 4	...	...	...	...	4	B	18	300
6.00	8.00	2 6	5 2	...	...	...	...	3	B	16	300
8.00	9.00	2 4	2 4	...	...	...	...	3	B	17	250
9.00	10.00	2 0	2 0	...	...	...	...	4	B	6 to 18	500
10.00	11.00	0 4	0 4	...	...	...	...	3	B	6 to 17	450
11.00	12.00	...	...	...	...	...	1	3	B	6 to 17	450
12.00	6.00	...	...	...	...	...	6	3	B	...	450
2.25	6.30	...	...	...	...	...	1.05	2	B	12	450
7.30	9.10	1 0	2 6	...	...	...	...	3	B	10	400
9.10	12.00	1 4	1 6	1½	...	...	...	3	B	12	450
12.00	1.30	2 0	3 0	...	...	...	..	3	C	10	400
1.30	3.55	...	...	2.25	...	...	...	3	B	10	400
3.55	6.00	0 4	1 2	...	...	...	...	4	C	12	450
6.00	12.00	...	...	...	...	...	...	...	...	...	...
12.00	6.00	...	...	...	...	...	...	...	...	...	...
9.30	12.00	2 4	6 2	...	...	...	...	3	C	12	400
12.00	3.30	3 4	10 6	...	...	...	...	3	J	5 to 15	1000
3.30	5.00	...	...	1½	...	...	...	4	...	...	...
5.00	7.05	3 4	7 1	...	...	...	...	2	B	6 to 18	800
5.00	8.00	3 0	9 0	...	...	...	...	3 to 6	J	12	700
8.00	10.00	2 4	5 0	...	...	...	...	...	B	14.6	1400
10.00	11.20	2 0	2 6	...	...	...	...	...	J	12	700
11.20	0.40	...	...	2.20	...	...	...	...	J	12	700
0.40	3.00	4 4	10 4	...	...	...	...	1 to 4	C	9	900
3.00	5.10	4 4	9 6	...	...	...	..	...	B	10	2000
5.10	6.15	...	...	1.05	...	...	...	...	B	9	700
6.15	7.05	5 0	4 2	...	...	...	...	...	C	10	900

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
3 to 5	....	...	...	8th August.
3 to 5	L.	...	...	Warping and steaming. An important
4 to 5	Momekee.	Ferry.	...	line of traffic. Bank cutting away,
3 to 5	....	...	...	anchored in the stream.
2 to 5	....	...	...	9th August.
4	Rath.	...	...	Lost much time to-day by accidents.
4	....	...	...	Vessels not steering.
4 to 5	....	...	...	
				10th August.
4 to 5	....	...	...	
4 to 5	....	...	...	
3 to 5	....	...	...	
2 to 5	....	...	...	Channel narrow, but the whole country
4	....	...	...	swamped.
2 to 5	....	...	...	
4½	....	...	...	
3 to 4	....	...	...	
2 to 4	....	...	...	11th August.
2 to 4	....	...	...	
2 to 5	....	...	...	
2 to 5	....	...	...	
4 to 5	.. ..	...	...	Could make no progress, warping.
4 to 5	....	...	...	ditto. ditto. tracking.
4 to 5	....	...	...	12th August.
3 to 5	....	...	...	
3 to 4	Buchewate L.....	...	...	
3 to 4	....	...	...	
4	Mulkaree R.	Ferry.	...	
3 to 5	Mamekee R.	Ferry.	...	
				The ferry of Pank Puttun town.
				13th August.
...	....	...	...	Transferred the remainder of the flat's
...	....	...	...	cargo into boats, and left her secured
				to the bank.
3 to 5	Wehale L.	...	...	14th August.
3 to 5	....	...	...	
...	....	...	..	Along a general bank of brushwood,
3 to 4	Ratteh R.	...	...	there are patches of jungle of large
				trees.
2 to 7	....	...	...	15th August.
...	Gundookh.	...	...	
...	Hussansheb.	Ferry.	...	Near this place some good jungle for
..	....	...	...	fuel.
2 to 5	....	...	...	Water much spread. Channel not de-
2 to 3	Sairoo L.	Ferry.	...	fined. At this place in the low season
2 to 5	....	...	...	of '41 sheep could ford the river, and
2 to 4	....	...	...	in '44 there was also a ford.
				16th August.

Hours.		Rate per hour.	Distance made.	Detentions.—Hours.				Height of Bank.	Cultivation, Jungle, &c.	Channel.	
From.	To.			For Fuel.	Grounding.	Not steering.	Obliged to warp.			Depth, feet.	Width, yards.
		M. F.	M. F.								
4.50	7.00	5 4	12 0	...	...	...	...	1 to 5	B	7	900
7.00	8.00	5 4	5 4	...	...	...	...	1 to 5	B	9	700
8.00	9.00	3 0	3 0	...	...	...	...	1 to 6	B	14	250
9.00	10.00	3 0	3 0	...	...	...	...	1 to 4	B	14	250
10.00	11.45	2 0	3 4	...	...	...	...	1 to 3	B	12	300
11.45	1.15	...	...	1½	...	...	...	1 to 4	B	...	...
1.15	3.00	3 2	5 0	...	...	...	...	1 to 5	B	4 to 5	1200
3.00	5.45	4 0	11 0	...	...	...	...	1 to 5	B	5 to 6	1300
5.45	7.00	...	...	...	...	1¼	...	2	B	10	250
5.30	6.00	3 4	1 6	...	...	...	...	2	B	13	250
6.00	7.00	3 0	3 0	...	...	...	...	3	B	12	600
7.00	8.00	4 0	4 0	...	..	...	...	2	B	10	700
8.00	9.00	4 0	4 0	...	...	...	...	2	B	10	600
9.00	10.00	3 0	3 0	...	...	...	...	3	B	12	500
10.00	10.40	4 0	2 6	...	...	...	...	2	B	16	200
10.40	0.50	...	...	...	2.10	...	...	2	B	13	20
0.50	1.10	0 4	0 2	...	...	...	...	2	B	17	300
1.10	4.00	...	...	3.50	...	...	...	2	B	17	300
4.00	5.00	4 0	4 0	...	...	...	...	3	B	16	450
5.00	7.35	3 0	7 5	...	...	...	...	4	B	12	600
5.00	6.00	2 4	2 4	...	...	...	...	3	B	7	1000
6.00	7.00	2 0	2 0	...	...	..	...	2	C	4 to 7	1200
7.00	8.45	2 0	3 4	...	...	...	...	3	B	4 to 6	1200
8.45	9.35	...	...	...	...	...	...	...	...	...	...
9.35	12.00	1 6	4 1	...	...	...	...	2	C	4 to 9	1000
12.00	4.00	2 0	8 0	...	...	...	...	3	B	6 to 12	650
		800 2	133 10	40.40	101.45	86.10					

The number of hours under steam this voyage was 439½; the distance from

(True Copy.) (Signed) E. J. Browne,

Secretary Scinde Government.

(True Copies.) (Signed) P. M. Melvill, *Lieut. Col.*,

Secretary to Government.

Strength of Current.	Names of Villages.	Ferries and Fords.	Thermometer.	Remarks.
2 to 4	Jangra L.	Ferry.	...	Channel intricate, and narrow.
2 to 4	....	...	...	
3 to 6	Tajeke R.	Ferry.	...	
3 to 6	Bodala L.	...	...	
4 to 6	Goarka L.	Ferry.	...	
...	....	...	...	
3 to 5	....	...	...	
2 to 7	Todb R.	Ferry.	...	In a contracted part of the river, vessels
5	....	...	...	would not steer, and the paddle was seriously strained, and nearly all the floats broken by striking the bank.
3 to 6	Boogiah L.	Ferry.	...	17th August.
3 to 7	Madher L.	...	...	
3 to 5	Kameka L.	...	...	
3 to 5	Sabhan L.	...	...	
4 to 6	Pany Girab R.....	Ferry.	...	
2 to 4	Mohunker L.	...	...	Channel divided: went up the wrong
3	....	...	...	one and warped over the bar, having
3	....	...	...	two feet on one side, and not breadth
3	....	...	...	enough of deeper water to admit of
2 to 5	Mehter R.	Ferry.	...	passing.
3 to 5	Matanno R.	...	...	Four miles below Nimrod fort.
				18th August.
4 to 6	Buttee L.	Ferry.	...	Lost half an hour by wrong channel:
4 to 6	Nimrod L.	Ferry.	...	current strong, channel bad.
4 to 6	....	...	...	
...	....	...	...	Stopt 0.50 to repair paddle-wheel.
5 to 7	Kinadaka L.	...	...	
4 to 6	Ferozepore L.....	...	...	Secured at Ferozepoor Ghat.

"Sukkur" to Ferozepore by water being just 300 miles.

(Signed) W. Christopher, *Senior Lieutenant, I. N.*

(True Copy.) (Signed) F. T. Powell, *Commander, I. N.,*

Commanding Indus Flotilla.

ART. VII.—*Report on the practicability of Navigating the River Nerbudda between Hindia and the Falls of Dharee.* By Lieutenant R. H. KEATINGE, Assistant to the Superintendent at Nimar.

[Presented by Government.]

No. 310 OF 1848.

From R. N. C. HAMILTON, *Esquire, Resident at Indore,*

To A. MALET, *Esquire, Chief Secretary to the Government of Bombay.*

DATED INDORE RESIDENCY, 28*th February*, 1848.

SIR,—With reference to my letter, No. 1266, dated 24th August last, forwarding Lieutenant Evans' report on the Navigation of the Nerbudda, I have now the honor to forward, for the information of the Hon'ble the Governor-in-Council, a report from Lieutenant Keatinge on the practicability of Navigating the River between Hindia and the Falls at Dharee.

2. The report is unfavorable, and from my own personal examination at Dharee, I am satisfied that, for the purposes of Commerce, the Nerbudda is not available.

I have the honor to be, &c.,

(Signed) R. N. C. HAMILTON,

INDORE RESIDENCY, 28*th February*, 1848. *Resident.*

(Copy)

From Lieut. KEATINGE, *Assistant to the Supt. at Nimar,*

To R. N. C. HAMILTON, *Esquire, Resident at Indore.*

DATED HINDIA, 9*th February*, 1848.

SIR,—On receiving your instructions at Timbornee to examine the Nerbudda from Hindia to the Falls of Dharee, I proceeded to the former place, where I arrived on the 29th of January, and have now the honor to lay before you the result of my expedition.

2. About Hindia the river does not appear to be applied to any

useful purpose, and the only available boats, or boatmen, are those employed at the different ferries or ghauts.

3. The boats are consequently unfitted for ascending and descending the more difficult parts of the river, being too broad and low-sided, and the boatmen are unskilful in their use.

4. With some difficulty I succeeded in procuring, from a village a few miles above Hindia, a boat that, from its shape, was more suited to my purpose, and having fitted it with mast and sail, and engaged boatmen, I started on the afternoon of the 30th of January. The boat was flat-bottomed, 19ft. 9in. long, and 4ft. 9in. broad.

5. I was accompanied from Hindia to Mundhar by two canoes lashed together and manned by fishermen; these I found most useful, as they enabled me to precede the larger boat in places where, from the shallowness of the water, its progress was necessarily slow. From Mundhar I permitted them to return, as I found I could dispense with their assistance for the remaining part of the journey. For any purpose of traffic, these canoes would be perfectly useless, as the waves in the rapid parts of the river completely fill them, and if laden they would sink.

6. From Hindia to the junction of the Ajnal River, the Nerbudda is unusually favorable for navigation. Near the foot of Joga we were delayed by some rapids, but to boatmen well acquainted with the River they would be impediments of no moment.

7. Commencing at the Ajnal River the bed of the Nerbudda extends to nearly double its usual width, and is divided into many small shallow streams, running between rocks and jungle, the inclination being so great as to give this part of the river more the appearance of a collection of mountain streamlets than the course of an important river. At the junction of the Machuch River, these rapids cease, and the stream is concentrated into one large deep pool to the head of the Mundhar falls, a distance of two miles.

8. The Mundhar falls are almost as high, and the descent of water more perpendicular, than the falls of Dharee, which in general character they closely resemble. Towards the southern bank a smaller stream makes the same descent in a number of short drops, down which my boat was dragged by thirty men, but in places it was almost carried.

9. From Mundhar to Basnia, opposite Chandghur, the river resumes its usual character of pools and shallows.

10. From Basnia to within a few miles of Dharee, high abrupt rocks rise on each bank of the river, which flows between them, hemmed in to about a quarter its usual width, with rapids almost every mile: at one place it narrows to 34 feet.

11. I reached Dharee at noon on the 7th of February, having thus been nine days on my way.

12. From my personal observations, and the enquiries I was enabled to make, I am of opinion that, from the junction of the Ajnal river to the bottom of the Mundhar falls, the Nerbudda is useless for navigation.

13. From Basnia to near Dharee the river is only just passable, and I fear that the number of men who would be requisite to take a laden boat down it would make the cost of carriage equal to, if not greater than, what it would be on land.

14. It is impossible to conjecture how the rise of the river during the rains may affect this last portion of the stream. It appears to me that it would probably cover the difficulties, but the boatmen hold a contrary opinion, and, until a trial has been made in that season, the question must, I fear, remain undecided.

I have the honor to be, &c.,

(Signed) R. H. KEATINGE, *Assistant to the Supt. of Nimar.*

(True Copy.) (Signed) W. F. EDEN, 1*st Assistant to Resident.*

(True Copies.) (Signed) J. G. LUMSDEN, *Secretary to Government.*

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

ART. VIII.—*Memoir on the Western or Edoor Tribes, inhabiting the Somali Coast of N. E. Africa; with the Southern Branches of the Family of Darrood, resident on the banks of the Webbi Shebeyli, commonly called the River Webbi.* By Lieutenant C. J. CRUTTENDEN, Indian Navy, Assistant Political Agent at Aden.—Dated Aden, 10th April, 1848.

[Presented by Government.]

DURING the time that I was employed at the wreck of the East India Company's Steam Frigate *Memnon*, at Ras Asseyr, on the N. E. coast of Africa, I employed myself in obtaining what information I could relative to the Tribes on the coast, which I had the honor to forward to Government on my return. As, however, I have since that time had further opportunities of visiting the different branches of the Somali tribes, I now beg to offer a few remarks in addition, relative chiefly to those tribes inhabiting the African coast westward from Burnt Island, and distinguished amongst the windward tribes as the "Edoor."

From Ras Hafoon, on the eastern coast, to Zeyla, the country is known by the name of the Bur-e-Somal, and it is divided into two great nations, who, both tracing their origin from the Arab province of Hadramant, are yet at bitter and endless feud with each other. The principal of these two great families is that to the eastward, or windward of

Burnt Island. It is divided into four large and three smaller tribes, as follows :—the Mijirtheyn, the Ahl Oor Sungeli or Wur Sungeli, the Dultahutah, and the Ahl Agahdur, forming the chief branches. Murreyhan, Girrhi, and Burtirrhi, the smaller ones. They claim as their common father Darrood, the son of Ismail, the son of Okeil, the son of Arab, who came from Hadramant, and, marrying a daughter of the Haweea tribe, residing on the N. E. coast of Africa, became the first Mahomedan founder of the Somali nation to the eastward—a nation extending to bunder Jedid or Burnt island to the eastward, and reaching as far as the northern Webbi river, or the Shebeyli to the southward.

The second of these two nations extends from Burnt island, or bunder Jedid, to Zeyla, and is divided into three great tribes, namely, the Haber Gerhajis, the Haber Awul, and the Habertel Jahleh, (Haber meaning the sons of,) who were the children of Isaakh by three wives—the said Isaakh having crossed over from Hadramant some time after his countryman had founded the nation to the eastward, and settled at the town of Meyet, near Burnt island, where his tomb exists to this day. Isaakh, finding his influence on the increase, owing to his intermarriage with a Galla tribe, made a sudden descent upon the neighbourhood of Berbera, then in the hands of a celebrated Galla chieftain, Sultan Harrireh (whose residence in a cave is still shewn, not far from Berbera,) and succeeded in obtaining possession of the country as far as Zeyla. The eldest branch, the Haber Gerhajis, was put in possession of the frontier mountains of Koobis and Woghur to the southward, and the other two brothers were placed on either side of them, the Haber Awul establishing themselves on the lowlands from Berbera to Zeyla, and Habertel Jahleh locating themselves at Kurrum, Enterad, Unkor, and Heis, four small ports to the eastward of Berbera. The Patriarch, Isaakh, was gathered to his fathers at a very advanced age, and was buried at the town of Meyet, leaving behind him a name which is honored and respected to this day.

The tract of country thus subdued yet remains in the hands of the posterity of Isaakh. The Galla tribes of the Esa Somal, and Gidr Beersi, to the westward, professed the faith of Islam, and were permitted to retain their possessions. Of these tribes, the Gidr Beersi limit the Hebrawul to the westward, and are themselves bounded by the Esa Somal, a very numerous horde, nominal Mahomedans, who extend as far as Hurrur to S. S. W., and to the borders of the Weima and Dunkali

country to the westward. The remaining Galla tribes either became mixed up with their semi Arab conquerors, or were driven across the Webbi river. I ought to say one of the Webbi rivers, for there appear to be three or four, though the principal branch, and that to which I allude, is, doubtless, the Shebeyli, a river* taking its rise in the province of Gurague, and which, making a considerable curve to the N. and E., finally loses itself in the sand below Mukdesha, and not far from the sea.

In the meanwhile, the nations to the eastward had not been idle. The Mijirtheyn and Ahl Oor Sungeli secured the whole seaboard from Hafoon to bunder Jedid; the Dultahutah established themselves on the prairie land south of the lofty range of the Oor Sungeli mountains; the tribe of Murreyhan took possession of the country of Nogal, abounding in myrrh of the finest quality; whilst the Ahl Agahdur, Girrhi, and Burtirrhi, occupied the country to the westward, until they reached to the south of Berbera. The southern boundary of the four last named tribes of Darrood was the river Webbi, or Shebeyli, which thus defines the Somali country from near Mukdesha, on the eastern coast, to twelve days' journey S. S. W. from Zeyla.

The subdivisions of the three principal descendants of Isaakh are well known, as also are those of Darrood, but I have been able to glean only scanty information regarding the smaller and more distant tribes of Murreyhan, Girrhi, Burtirrhi, and Burzook. The Gidr Beersi and the Esa Somal have several peculiarities which mark their Galla origin. The Esa have three chiefs, each styled, in the language of the country, Oghass. Of these, Oghass Farah and Oghass Robeleh are the most powerful, their residence being in the neighbourhood of Hurrur, from the Emir of which place each annually receives a red flannel nightcap and a few pieces of cloth. "As treacherous as the Esa" is a proverb at Zeyla, whose inhabitants declare that their savage neighbours will give you a bowl of milk to drink with one hand, and stab you with the other. From my personal experience of them, I have but too much reason to consider them a cruel and treacherous race, amongst whom murder (the more atrocious the better) is at a premium, and who can in no way be trusted save at the expence of a heavy bribe.

* Called by Lieutenant Christopher the Hamess river. I am assured by many of the Somalis who have traded beyond Hurrur, that the three rivers, the Jooh or Webbi Gunana, the Shebeyli, and the Hawash, all take their rise in the mountains of Bugama.

The Gidr Beersi are a shade more civilized than the Esa, owing probably to their commingling more with the Somali tribes. Both the Esa and Gidr Beersi, however, scarcely deserve the name of Mahomedans, for hardly one in a hundred can pray, and reading and writing, save in the case of a few very learned men, are unknown. I have been assured by many of the Gidr Beersi that in the mountains forming the southern barrier of their country are many wonderful ruins of stone and chunam, the work of former ages, and abounding in inscriptions which no one can read. However tempting this description may appear, it must be received "cum grano," for, after a careful search along the coast from Cape Asseyr to Zeyla, I have not succeeded in finding any remains of antiquity, save the aqueduct at Berbera, elsewhere mentioned in this memoir, nor is it likely that an illiterate savage would be able to distinguish an inscription from an ornamental border on a stone. It is, however, to be hoped that an opportunity will be afforded of examining this very interesting country. Interesting it must be for many reasons: the possibility of inscriptions; the extensive coffee districts; the probability of the more northerly rivers that reach near the sea either flowing close round, or taking their rise in, the mountains; and, further, the certainty that no European foot has hitherto traversed this part of the country.

The Esa tribe are generally at feud with their Hebrawul neighbours to the eastward. The number of horses that they possess renders their habits more predatory, if possible, than otherwise they would be; and their forays are distinguished for the rapidity with which they are conducted, the secresy with which they are carried out, and the cold-blooded and ferocious conduct of the warriors engaged in the expedition. In February last year, a feud between two tribes near Berbera induced one, the Aial Yunus, to settle inland from a small roadstead called Bou'l Harr. Here a few traders joined them; and, having left their women with the old men and children at the encampment inland, the men descended to the beach, to carry on their trade. Whilst thus employed, and unsuspicious of any danger, a foraying party or "Ghuzoo" of about 2,500 Esa Somalis attacked the camp inland, and put every one to the sword: men, women, and children, were indiscriminately massacred; and, laden with an immense amount of booty, the plunderers reached their villages in safety. The Aial Yunus, paralysed by this catastrophe, were fain to send for assistance to their brethren at Berbera, and, marching shortly after inland, met with a fresh body of the Esa preparing to make a second descent, and slew above 650 men.

The city of Hurrur, in the province of that name, though hardly in the Somali country, is closely connected with it by its commerce, especially by its slave trade. Mr. McQueen, in his valuable Geographical survey of Africa, places it, in my opinion, too far to the southward and westward. It is eight days' journey for a kafila of camels from Zeyla to Hurrur, and nine days from Berbera, and this would place it in about Latitude 9°22′ N. and Longitude 42°35′ E.

A tradition exists amongst the people of Hurrur, that the prosperity of their city depends upon the exclusion of all foreigners not of the Moslem faith, and Christians are especially interdicted. From what I have been able to gather, the traveller would hardly be repaid for the risk and fatigue that he would have to undergo; and if he travelled as an European, he would be exposed to much insult and ill feeling from the bigoted ruler and inhabitants of the place, who, sunk in the lowest ignorance, still plume themselves upon their superior sanctity as followers of the true faith.

The Government, founded, in all probability, during the reign of Suleiman the Magnificent, when the Turks held possession of Aden, is hereditary, and held by an Emir, all of whose male relatives, as was formerly the case in Shoa, are closely imprisoned, as a guard against domestic treachery. The Emir's house is perpetually surrounded with guards, and no one dares to pass the gate of the court-yard mounted, or at a walk—he must cover his face and run. The Emir's guard is composed of perhaps sixty matchlock-men, and he has also a body of native spearmen in his pay. A few rusty old iron guns, lying *outside* the walls, with their muzzles pointed towards the Galla country, are quite sufficient to keep those unruly savages from entering the city, but the flocks and herds are frequently carried off close to the walls.

The city is described as larger than Mokha, and situated in a fertile country, but fast decaying. Though many large and well-built houses of mud and stone are still to be found, the majority of the people live in huts made of mats and reeds, with a thorn fence round them. There are five gates to the town, viz., Bab Gooboi, Bab Joomboi, Bab Dimboi, Bab Budrobin, Bab Sukbakburri, the whole of which are locked nightly with the most jealous care, and the keys carried to the Emir's house,—a precaution which, seeing that about twenty yards of the wall is knocked down, appears rather excessive. The "Ashraffi," stamped at the Hurrur

mint, is a coin peculiar to the place.* It is of silver, and is the twenty-second part of a dollar. The only specimen that I have been able to procure bore the date of 910 of the Hejira, with the name of the Emir on one side, and on its reverse "La Illahi il Ullah." The coffee districts are described as lying amongst a low range of mountains near Hurrur, and to the southward. The quantity exported is very large, and the quality fully equal to that commonly sold as "Mokha." Besides coffee, Hurrur exports white cotton cloths, used as dresses by the wealthiest classes. They are known by the name of "Tobe Hurruri," and consist of a double length of eleven cubits by two in breadth.† They have a deep border of various colors, of which some are very good, especially the scarlet. The cotton of which they are made is grown at Hurrur, and the price of a really good dress is from five to eight dollars. On the windward coast one of these dresses is considered a handsome present for a chief, and I have been offered a horse in exchange for one of moderate quality. A few silk loongies are also manufactured at Hurrur, and I was assured that the silk is brought from the countries south of Shoa. Cardamoms, gum mastic, myrrh, a small quantity of manna, saffron, and safflower, with the articles abovementioned, comprise the extent of the Hurrur trade so far as regards produce, but the most valuable branch of commerce is the export of slaves from Gurague and Habesha.

The duties levied at Hurrur are ten per cent on imports and exports, and a further tax of six pounds of brass, or two and a half dollars, is laid on slaves of both sexes. The country in the vicinity is described as well watered and fertile, and between the city and port of Zeyla the traveller crosses six small mountain streams of inconsiderable magnitude flowing to the S. E., viz., Mugush, Shuktheyeh, Subbill, Shefee Anman, Billoo, and Hamer.

Zeyla, the sea port of Hurrur, but under the dominion of the Shereef of Mokha for the time being, is a miserable mud-walled town, containing some twelve to fifteen stone houses, 180 huts, and 750 souls. It is situated on a low sandy point nearly level with the sea, and its nearest well of drinkable water lies at a distance of seven miles. A vessel of 250 tons cannot approach within a mile of the town, and the anchorage is shallow, and difficult of entrance after sunset, on account of several

* The value of the Ashraffi changes with each successive ruler. In the reign of Emir Abd E. Shekoor, some 200 years ago, it was of gold.

† The Hurrur cloth is considered fully equal to that manufactured in Shoa.

reefs. Zeyla, no doubt, originally was intended to serve as a sea port for Hurrur, for, of itself, it appears to be worth little. There are no remains of antiquity to be found either in the town or neighbourhood, and I should not assign an earlier date to the settlement than A. D. 1500, or shortly after the occupation of Yemen by the Turks.

When the Turks were compelled to retire from Yemen, the town of Zeyla was subject to the Chief of Sana, who gave it in perpetuity to the family of a Sanani merchant, Syed-el-Bhor, in the hands of whose descendants it yet remains; but the kingdom of the Imam, like most other native principalities, having fallen into decay; the town is now under the authority of the Shereef of Mokha, who has the power of displacing the Governor, should he think fit, but who yet receives no part of the revenue. This is farmed out, and the present Chief, Hadj Shermarkhi Ali Saleh, pays annually to Syed Mahommed-el-Bhor, at Mokha, the sum of 750 German crowns, and reserves all that he can collect above that sum for himself.

The Governor has to provide fifty matchlockmen from the Arab coast to defend the town and well. They are paid on an average two and three quarter dollars per month in kind, and must find their own gunpowder. Occasional bribes are necessary to keep up the good feeling of the Shereef of Mokha and the men about him, and altogether the office of Governor at Zeyla must be as expensive as it is troublesome.

Zeyla levies a tax of one dollar upon each slave exported from Tajoura, or imported from Hurrur, and afterwards sold at Berbera. Formerly Zeyla obtained but three quarters of a dollar per head, the Sultan of Tajoura receiving the remainder, but this has of late fallen into disuse.

With reference to the slave trade, the position of Zeyla is important. It is the sea port of Hurrur, and it commands Tajoura and Berbera, the only available places of export; and when the time arrives for the final suppression of the slave trade on the north-eastern coast of Africa, the numerous advantages held out by Zeyla will be duly appreciated. As I have shown, Hurrur depends for its foreign supplies solely on Berbera and Zeyla, and were these two ports cut off from the merchants, so far as regards the sale of slaves, it must prove a death blow to the slave commerce through that province from Abyssinia and Gurague. Berbera once forbidden, Tajoura is the only remaining outlet, and that outlet, thanks to the marauding habits of the Esa Somal and others, is much more frequently closed than open.

With the above brief sketch I close my remarks on the Gidr Beersi and Esa Somal tribes, the western boundary of the Somali nation, and now beg to offer what information I have been able to collect relative to the three great tribes of Haber Gerhajis, Haber Awul, and Habertel Jahleh.

The Haber-awul, as I have before stated, occupied the low lands between Berbera and Zeyla, a fertile tract of country, with several low ranges of hills, and averaging perhaps forty miles in depth to ninety in length. The number of sheep, goats, she camels, &c., found on these plains, is perfectly incredible, fully realizing the account given of the flocks and herds of the patriarchs of old, for many of the elders of these tribes own each more than 1500 she camels, and their flocks of sheep are literally uncounted. Asses are very numerous, and most admirably adapted to the country. The camels are small and weak, and are never used for riding, except in a case of sickness, or a wound. The Haber-awul have no Chief. The customs of their forefathers are the laws of the country, and appear to be based upon the simple principle that might gives right. Theft is punishable with the loss of the right hand, and fortunate it is for the Haber-awul that this is not insisted upon, for they are the most inveterate thieves that I ever found on the coast. They wear the "Reesh," or Ostrich Feather, after slaying a man, but speak with abhorrence of the Esa custom of mutilation after (and sometimes before) death.

Two branches of the Haber-awul tribe, the Aial Ahmed * and the Aial Yunus, having established themselves at Berbera, took upon themselves the office of protecting strangers who annually visit that port during the time of the great fair. The "Abban," as the protector is called, is bound to arrange all disputes, and even fight all battles, that may arise between his client and his countrymen. In all sales or purchases he acts as broker, and in like manner does not forget to demand his brokerage. His food and lodging are provided at the expense of the merchant who employs him, and the office is considered honorable, as well as lucrative. The thieving propensities of the Haber-awul, above alluded to, are not indulged in in these cases, but should the merchant have the presumption to trust to himself, and to dispense with an "Abban," the chances are that he would be despoiled of all his goods.

The Aial Yunus, who are more numerous than the Aial Ahmed, for

* The following shews the descent of the Aial Ahmed and Aial Yunus from Isaakh:—Isaakh, Habir Awul, Musa, Saad, Isaakh, Awuth, Abou Bekr, Jibnil, Ismail, Noh, Yunus Ahmed, Aial Yunus, Aial Ahmed.

some years admitted them to equal participation in these profits, but after the occupation of Aden by the British, the office became more valuable, in consequence of the Aden Banians employing an "Abban" throughout the whole year, who, when the fair was over, proceeded inland with an investment of goods, and purchased, in anticipation, much of the produce of the future year.

Jealousies soon arose, and the Aial Yunus shortly after drove the Aial Ahmed out of Berbera, and declared themselves the only "Abbans" for strangers during the fair. The Aial Ahmed upon this took advantage of Berbera being deserted as usual, and, with the assistance of Hadj Shermarkhi Ali Saleh, governor of Zeyla, erected four martello towers on the spot generally occupied by the town, and hired thirty matchlockmen to garrison them. A battle of course ensued, and, assisted by the foreign allies, the Aial Ahmed drove the Aial Yunus away from the place, with the loss of thirty-three killed and double that number wounded.

From this period the two tribes have been at deadly feud. The Aial Yunus established themselves at the roadstead of Bou'l Harr, about twenty-five miles to the westward of Berbera, and, from their influence and connections with the Indian merchants, succeeded in drawing a considerable portion of the trade to the new settlement.

Everything, however, turned against them. A gale of wind during one season destroyed seven native vessels fully laden, and the Esa Somal in February 1847 committed frightful slaughter amongst their women and children, compelling them to sue to the Aial Ahmed for assistance. The present season will, it is to be hoped, put an end to the feud. The Aial Ahmed will destroy their ports, and the trade will then be carried on as before; but amongst these savage tribes, promises are of no avail, and the slightest provocation, on either side, will be the signal for the renewal of hostilities.

The fair at Berbera is now so well known that it may appear superfluous to give any further description of it, but as it is the principal port in the Haber-awul country, a few remarks regarding it may not be considered out of place.

That Berbera has existed as a port of great trade for several centuries, I conceive to be almost sufficiently proved by the fact of its being an annual rendezvous for so many nations to the present day, and from the time for this great meeting having been chosen so as to suit the set

of the Red Sea and Indian monsoons. But, with the exception of an aqueduct of stone and chunam, some nine miles in length, of which a short account will be found in another portion of this memoir, Berbera exhibits no proofs of antiquity; and the extraordinary remains of buildings, castles, reservoirs, &c., still found at the ancient emporia of Aden, Hisu Gherab, and Nukab-el-Hajar, have no place on the sandy shores of N. E. Africa.

The annual fair is one of the most interesting sights on the coast, if only from the fact of many different and distant tribes being drawn together for a short time, to be again scattered in all directions. Before the towers at Berbera were built, the place from April to the early part of October was utterly deserted, not even a fisherman being found there; but no sooner did the season change, than the inland tribes commenced moving down towards the coast, and preparing their huts for their expected visitors. Small craft from the ports of Yemen, anxious to have an opportunity of purchasing before vessels from the Gulf could arrive, hastened across, followed about a fortnight to three weeks later by their larger brethren from Muscat, Soor, and Ras-el-Khyma, and the valuable freighted bugalas from Bahrein, Bussorah, and Graen. Lastly, the fat and wealthy Banian traders from Porebunder, Mandavie, and Bombay, rolled across in their clumsy kotias, and with a formidable row of empty ghee jars slung over the quarters of their vessels, elbowed themselves into a prominent position in the front tier of craft in the harbour, and, by their superior capital, cunning, and influence, soon distanced all competitors.

During the height of the fair, Berbera is a perfect Babel in confusion, as in languages: no chief is acknowledged, and the customs of bygone years are the laws of the place. Disputes between the inland tribes daily arise, and are settled by the spear and dagger, the combatants retiring to the beach at a short distance from the town, in order that they may not disturb the trade. Long strings of camels are arriving and departing day and night, escorted generally by women alone until at a distance from the town; and an occasional group of dusky and travel-worn children marks the arrival of the slave kafila from Hurrur and Efât.

At Berbera, the Gurague and Hurrur slave-merchant meets his correspondent from Bussorah, Bagdad, or Bunder Abbas; and the savage Gidr Beersi, with his head tastefully ornamented with a scarlet sheepskin in lieu of a wig, is seen peacefully bartering his ostrich-feathers and gums

with the smooth-spoken Banian from Porebunder, who, prudently living on board his ark, and locking up his puggree, which would infallibly be knocked off the instant he was seen wearing it, exhibits but a small portion of his wares at a time under a miserable mat shed on the beach.

By the end of March the fair is nearly at a close, and craft of all kinds, deeply laden, and sailing generally in parties of three or four, commence their homeward journey. The Soori boats are generally the last to leave, and by the first week in April Berbera is again deserted, nothing being left to mark the site of a town lately containing 20,000 inhabitants, beyond bones of slaughtered camels and sheep, and the framework of a few huts, which is carefully piled on the beach in readiness for the ensuing year. Beasts of prey now take the opportunity to approach the sea: lions are commonly seen at the town well during the hot weather; and in April last year, but a week after the fair had ended, I observed three ostriches quietly walking on the beach. The great drawback to Berbera as a port is the scarcity of good water, that in the two wells belonging to the town being almost too brackish for use, and the wealtheir portion of the merchants are therefore compelled to send to Seyareh, a small harbour eighteen miles distant to the eastward, for a supply. I had frequently been told by the Somalis at Berbera that the remains of an ancient aqueduct were still to be seen, and, taking advantage of an unavoidable detention at that port, I visited the ruins, and satisfied myself that in former times water had been conveyed to the port by an aqueduct of nearly nine miles in length.

At the distance of half a mile from the beach I found the remains of a small building, apparently a mosque, and close to it a shallow reservoir, built of stone and chunam, having a channel leading into it of about twenty inches in diameter and twelve in depth. I opened this channel in two or three places, and found it of an uniform size and structure. At about seven yards from the reservoir it was lost for some distance, but by walking in the direction of the nearest range of hills, known as Dthubar, slabs of limestone, and fragments of chunam, served to shew the general course of the aqueduct; and at about a mile from the hill of Dthubar, it was again found entire for several yards. The cement used was as hard as the stone itself, and, as usual in all ancient remains in this part of the world, mixed with large pebbles. Many graves are observed in the neighbourhood, and the stones of the aqueduct had been used to form the tombs.

Half a mile from these remains I arrived at a swamp, having at the

upper end a spring of water, which, when I last visited the place, shewed a temperature of 107° Fahrenheit, whilst the thermometer in the open air stood at 76°. The water was slightly bitter, and in quality highly astringent.

The remains of a small fort or tower, of chunam and stone, were found on the hill side immediately over the spring. In style it was different to any houses now found on the Somali coast. It would not contain more than ten or twelve men, and I imagine must have been intended as a kind of guard-house over the spring. On a hill to the N. E. of this, several small houses were found, each having a semicircular niche on the north side, similar to the prayer niche of the Mussulmans, but these again were built of loose stones, and I have seen others like them on the coast to the eastward of Berbera. Crossing the shoulder of the hill, another spring was found, apparently of rather better quality than the former, and which was the nightly resort of the wild ass, the ostrich, and the onyx, numbers of which were seen on the plains.

In the neighbourhood of the fort abovementioned abundance of broken glass and pottery was found, and from this I should infer that it was a place of considerable antiquity; but, though diligent search was made, no traces of inscriptions could be discovered.

The hill immediately over the spring is of moderate height, and of limestone formation, having many shells imbedded. Gypsum is found in large quantities, and from its unusual hardness I imagine that it has been used as cement for the aqueduct. There is no doubt but that the water from this spring was carried down by this channel to the town, inasmuch as no other water could be found at the termination of the ruins. The nearest part of the aqueduct yet remaining is fully one-third of a mile from the swamp, and at a higher level. I am not certain if the spring is likewise below the level of the ruins, but no traces of chunam or of any channel could be found near it. The nation, however, who could construct an aqueduct of so great a magnitude, would not find much difficulty in raising water to a higher level. The fact of the aqueduct being thus established, it remains now to discover what nation could have constructed, and at what time the commerce of Berbera was sufficiently important to warrant, so costly an undertaking.

In the size of its channel, and in its mode of construction, the Berbera aqueduct is similar to that near Aden, excepting that in the former case stone is used, and in the latter brick.

The Aden aqueduct was built during the reign of El Malck Mausur Taj-é-Deen Abdul Wahab-ibu-Taher, Imam of Sana and Yemen, in the year of Christ 1470. This Prince appears to have spent large sums in beautifying the different towns of Yemen, having constructed many reservoirs, mosques, and aqueducts, in other parts also; but the Arab manuscripts give no account of the Imams of Yemen ever having assumed authority over, or extended their conquests to, the Somali coast: and though Aden was, at that time, one of the chief halting-places in the then great commercial highway of the world, had the Arabs taken possession of Berbera, there would have been some traces of them to this day. With the exception of a brief period, A.D. 1173, when Aden was taken by the brother of Saleh-é-Deen of Egypt, we have no mention of its having been governed by other than Arab Rulers until it submitted to Sulliman Pasha in A. D. 1538; and, as Arabs are not in the habit of expending money for the benefit of other countries, and we have no mention of their ever having resided at Berbera, the credit of the Berbera aqueduct would appear to be due to the Turks during the hundred years that they held Yemen.

But we are informed that A. D. 522 the Persian troops in the reign of Amishirwan drove the Abyssinian invaders of Yemen out of the country, and re-established a Hirnyari Prince on the throne of his father as a vassal of the Persian monarch; and Gibbon supposes that two years were consumed in this invasion of Yemen. Amishirwan was distinguished for his generous and wise government,—for the splendour of his public buildings, and especially for his aqueducts. The Persian troops on their arrival at Aden found a nation equalling themselves in civilization, and, as the ruins of Mareb Nukab-el-Hajar, and the unexplored cities of Hadramant, testify, skilled in architecture. To this date should I attribute the construction of the Berbera aqueduct. The trade carried on by the Red Sea was in those days great; the ancient emporia of Hisu Gherab and Aden prosperous and wealthy; and Berbera then, doubtless, carried on the same trade in ivory, gums, and ostrich feathers, that it does now. Lastly, I may observe that the chunam or lime used in the reservoir and aqueduct at Berbera is stated to be similar to the "Kutch or Gutch" of Persia.

During a short journey in 1847 I found the country inland from the hill of Dthubar consisting of low and undulating limestone ranges, thickly covered with tamarisk and acacia trees, and on the sides of the hills with the gum arabic. At the distance of two hours from Dthubar, I reached

the pass of " Gudh Harrireh," in which is to be seen a large cave, said to have been in former times the residence of the Galla Chief Harrireh, who was expelled from the country by the descendants of Isaakh. The rock at this part is exceedingly pure and white limestone, and would be invaluable in Aden were it not for the expense of carriage. In the valley close to the pass, red granite, porphyry, white marble, and large fragments of gypsum, are common. It is worthy of remark that the gum arabic tree at Berbera differs in every way from that exported from the windward coast, the leaf and the tree both being smaller and of a different shape. The plain beyond this valley, extending one hour's journey S.S.W., is infested with lions, hyenas, and leopards, and it is considered unsafe for a single individual to cross it at night. The Somalis who accompanied me when I visited this part of the country formed a stout thorn fence round the baggage to keep off the lions, who came close round us during the night, but who left us in peace as soon as they heard the report of my carbine, which my followers, taking advantage of my having dropped asleep, fired off, much to my annoyance.

At the southern extremity of this plain I reached the valley of Dunanjir, a steep ravine, having in its bed a few pools of very bad and stinking water, almost unfit for man to drink, but which, nevertheless, proved most acceptable to us after a hot and fatiguing march. Passing over several low ranges of limestone, through which in many places red granite had been thrust, I reached another water-course, having very steep banks of thirty to forty feet high, thickly wooded, and having a most picturesque appearance. The bed of the water-course was of soft white sand, in any part of which water was procurable by scooping a hole a foot in depth. On the range of mountains between Dunanjir and this valley, I observed many large blocks of very pure white marble, with an abundance of obsidian gypsum, and large masses of basalt. The geological formation of the country appeared to be entirely without order, and led to the idea that, by some extraordinary convulsion of nature, rocks of all kinds had been thrown together in one large confused heap. A huge natural cairn might be observed of thirty to forty feet high, composed of six or seven different species of stone, a block of marble lying over or under an equally large boulder of red granite, and flanked, perhaps, by a fragment of conglomerate or black basalt.

This valley is much infested with lions, leopards, &c., and the traces of elephants were numerous. The diameter of the lion's foot was five

and a half inches, and of the elephant, after several measurements, twenty-two inches, which would give a height of upwards of ten feet at the shoulder. This water-course passes round the western flank of the Dunanjir range, and can be traced down to the sea close to the town of Berbera. After heavy rains, it discharges a large body of water into the bay.

From this valley, my course lay over a rough and stony tract of country, in many places well wooded and watered, but, so far as regards its formation, exhibiting, if possible, a still stranger appearance than the valley above mentioned. Thousands of ant hills, rising like slender sandstone pillars, and in many cases fourteen feet high, were scattered in every direction, giving the country the appearance of an immense Turkish cemetery: many were hollowed out entirely, others were pierced with smaller channels longitudinally, and a current of hot air could be detected rushing through.

On first seeing these columns, I fancied that I had reached some ancient ruins, so numerous were they. In one instance, I observed a huge block of marble, weighing many tons, having three or four of these sand pillars round it, and bearing the exact appearance of a tomb. On the brink of a cliff close by, an enormous rock, of perhaps eighteen to twenty feet in diameter, and diamond-shaped, stood exactly balanced on its point, and to all appearance required but a push to send it down into the ravine below. The number of graves found in every direction, excited my surprise. They were well built, and bore marks of great antiquity, but no inscriptions were found on them. Night closed in before we reached the plain of Shimberali, and we were glad to find an empty sheepfold to shelter us for the night, after a march of seventeen hours on foot, of which three only could be spared for a halt during the greatest heat of the day.

Shimberali is part of an extensive plain, reaching from a solitary hill, called Deimoli, to the southern mountain range of Koobis, and Woghur, the frontier of the Haber Gerhajis tribe. It is inhabited by the Esa Moosa branch of the Haber Awul, who are looked upon by the elder branches of the tribe as a treacherous race, with whom it is advisable to keep on good terms, and who in their turn are at deadly feud with a branch of the Haber Gerhajis, residing on the mountains above them, and known as the Sulhehgiddib.

The plain is tolerably well wooded in some parts. Several varieties of

gum trees are found: the mimosa, tamarisk, wild fig, and several species of the cactus and aloe, are abundant; and in the deep fissures and rents made in the plain by the fury of the mountain torrents, a few dome and date trees are found. Elephants, lions, leopards, hyenas, wolves, and jackals, are to be seen on the plain, and occasionally a troop of ostriches. Salt's white antelope, the "sagarro" of the Somali, the koodoo, the kevel or scimitar-horned antelope, and the onyx, were the varieties of the deer species observed; and the small antelope, or gazelle, was very common. Jerboas and squirrels were numerous, and a species of toucan. The white vulture, of enormous size, and the common osprey, were the principal birds observed. In the hot season much inconvenience is occasioned by a species of hornet, the "dibber" of the Somali, and the zinib (?) of Bruce, who justly styles them a curse. The same evil extends along the whole coast during the S. W. monsoon, where the slaughtering a sheep brings the hornets round in myriads, and very shortly compels the unlucky traveller to shift his position as fast as possible from the neighbourhood of his Somali butcher.

The hill of Deimoli is a lofty conical mountain, in many parts inaccessible. It is a great resort for beasts of prey, especially for lions, and is therefore avoided by the shepherds. It is apparently of limestone, and thickly wooded. At its base stands a smaller hill, bare and barren, and bearing a most extraordinary appearance, from its being scolloped in regular furrows by the action of the rain from top to bottom. On every side of Deimoli huge masses of rock lie piled on each other, and in many of these nature appears to have indulged in the wildest vagaries. Several of these masses formed perfect funnels, and others exhibited a smooth round basin on their upper surface, capable of containing many hundred gallons of water.

From the shoulder of Deimoli I was able to sketch the course of the valley and water-course abovementioned. For some distance on the plain (two to three hundred yards) it exhibits a running stream, when it is lost in the sand for perhaps the same distance, and then re-appears as before. In almost every part of its bed, water is procurable by digging a foot deep. Large bullrushes and tall wiry grass grow in rank luxuriance on its banks, affording a good retreat for the wild pig, one long-legged specimen of which was seen and missed by me on my return. Snakes are reported to be numerous, but I saw none.

After a long and fruitless search after the elephants, a herd of which

seven in number, had passed a few hours before, and, after spending the night in the bed of a dry mountain torrent, I crossed over in a N. E. direction to examine another running stream, where I found excellent water falling down shelving linestone rock, forming pretty cascades, and collected into a tolerably large stone basin, the overflowings of which were lost in the sand. A large tree, from which depended a great many nooses of cord, attracted my attention, and I was told that once a year all the Bedouin families meet here, and each kills a sheep, which is hung up to one of these nooses, and then eaten, in common with the others. It is an observance intended to renew their friendship and acquaintance with each other, and as an opportunity of marrying their young people. On my return to Dthubar, I crossed over the Dunanjir range more to the eastward, and found them of the same formation as the hills I had observed on my way to Shimberali. The distance travelled over in this walk I compute at about seventy miles.

At a future period, accompanied by Commander C. D. Campbell, of the Indian Navy, I left Dthubar, and, after walking in a north-westerly direction, across a broad plain covered with ostriches, onyxes, koodoos, and quaggas, but all of whom, save the latter, were too shy to admit of our approaching within shot, we reached the bed of a broad water-course, having in its centre a stream of perhaps eight to ten feet in breadth, which at the distance of a mile below is absorbed in the sand. The native tradition says that the stream runs only by night, and from this it takes its name, "Bheeyeh Ghora"—"night-running water." The actual increase in the distance, occasioned doubtless by the evaporation being so great during the day, we found by measurement to be 135 yards, but the stream had then dwindled down to a mere thread. The temperature of the stream at seven A. M. was 69°, in the open air 71°. Following up the bed of this stream towards the hills, we observed in many spots the ground white with the efflorescence of nitre: the bitter taste of the water was thus accounted for. As we approached the narrow defile in the hills, through which the stream passed, pure salt was found adhering to the smooth sandstone rocks, generally encrusted on a dark-coloured vein, from which water exuded, and shortly after we reached a powerful hot spring, shewing a temperature of 125°, the thermometer in the open air standing at 76°.

Above this hot spring the valley became narrower, and, from the sandstone and limestone sides of the ravine, water was observed at almost every yard, dropping and forming large and beautiful stalactites. But

what was most singular, though the rock throughout was the same, a hot spring of water would be found within a yard or two of another of cold water, and though the hot springs were disagreeable to the taste, the water obtained from those that were cold was sweet and good.

Fully a hundred of these springs exist in this valley, and the temperature of the main stream varied from 91° to 105°, the highest temperature found in any of the hot springs being 125°, and the water appearing to be strongly impregnated with iron.

A peculiar kind of creeper grows in great luxuriance in the neighbourhood of the springs, which in every case ooze through the rocks. The dragon's-blood tree was observed on the hills above, and an ibis and a coney were seen, whilst a flock of large apes noisily resented our intrusion upon their retirement. The head of the stream, I was assured, was to be found in the mountain range of Woghur, which I have since personally ascertained to be the fact. Near where the stream is lost in the sand we found an extensive burial-ground; and the remains of several old buildings of small dimensions, of no great antiquity. The distance of Bheeyeh Ghora from the sea is not great,—perhaps six miles; and I have been assured by several respectable natives, that on the sea shore north of Bheeyeh Ghora, and at the spot where its waters are discharged into the ocean after heavy rains, the remains of an ancient reservoir and aqueduct are to be found, similar to that previously described as extending from Dthubar to Berbera.

It is worthy of remark that the majority of the streams running from the mountain ranges of Woghur and Koobis are bitter, and in quality highly astringent. There are, however, others that afford most delicious and pure water, to be properly appreciated only after a seven years residence at Aden. The country to the south is described as an inclined plain, without hill or rock, for seven days' journey, and, on arrival at the province of Agahdur, we were told that stones sufficient to make a fireplace were not to be found, whilst the country was one immense prairie of some twenty days' extent.

The Haber Gerhajis, the eldest branch of the three tribes of Edoor, reside chiefly in the mountains to the south of Berbera, whence they extend to the country of Agahdur. They are a powerful and warlike tribe, numbering many horses, in addition to their flocks and herds, and have a nominal Sultan, who possesses, however, but little influence or power over his savage subjects. From this branch of the family of Isaakh

sprung the venerable saint "Aber Khudli," whose tomb, S. W. from Berbera two days' journey, is yet the rendezvous when any grave question arises affecting the interests of the Edoor tribes in general. On a paper yet carefully preserved in the tomb, and bearing the sign manual of Belal, the slave of one of the early Khaleefehs, fresh oaths of lasting friendship, and alliances, are made,—to be broken again, as usual, without a shadow of provocation. In the season of 1846, this holy relic was brought to Berbera in charge of the Haber Gerhajis, and on it the rival tribes of Aial Ahmed and Aial Yunus swore to bury all animosity, and live as brethren in future—with how much sincerity, the events of the two succeeding seasons amply shew, some scores of lives having been lost on both sides.

In the country of the Haber Gerhajis, the principal articles of trade or produce are ghee principally, myrrh in small quantities, and of quality inferior to that produced in Agahdur and Murreyhan, luban of the first quality, ivory, ostrich-feathers, and gum arabic, with a small quantity of "shenna" or orchilla weed, and a still smaller supply of "warus"—a kind of saffron, used by the natives in Yemen to rub over their bodies.

The kafilas from the banks of the Webbi Shebeyli, from the small province of Gunana to the south of the above river, and from Agahdur, pass through the country of Haber Gerhajis on their way to Berbera, excepting the slave kafila from Abyssinia. These are the most valuable caravans of the season, bringing ivory from the Galla tribes of Sidama, south of the Webbi Gunana, ostrich-feathers, musk, myrrh, and frankincense. They frequently exceed 2000 camels in number, and are well guarded by the men of Agahdur, who may always be recognized amidst the crowd at Berbera by the red colour of their robes, produced, as they all declare, by the fine red dust peculiar to their country.

From Gunana to Berbera is twenty-four days for a kafila; from the Webbi Shebeyli nineteen days; and from Agahdur nine days. I consider the journey fully practicable for an European, if at all known to the Somali tribes on the coast; and in the more distant province of Agahdur his reception would be kind, and his person and property safe. In the small map of N. E. Africa appended to this memoir will be seen the position of the different tribes north of the Webbi Shebeyli, and my idea of the course of that river from Zeyla down to below Mukdesha. My information has been obtained from many natives of different tribes, and

by comparing one with the other, no very serious error can arise in a journey of twenty days, when the country, after the first ranges are surmounted, presents a level for several days.

Amongst the Edoor tribes, as with the descendants of Darrood, there exists a class of men who never carry the spear and shield, but whose sole arms are the bow and poisoned arrow. With a couple of arrows in his mouth, and half a dozen more dangling from his long tangled hair, the "Rahini" is feared alike by man and beast, and in all forays is looked upon as an invaluable ally. Inferior in caste, and not ranking with the gentle blood of the Somali aristocracy, the "Rahini" approaches in every respect to the freedman of the Romans. They are expert and daring hunters, crippling the elephant by a blow on the back sinew with a heavy knife,* and attacking even the stately African lion with no better arms than the tiny though unerring "nishab," or arrow.

The tree from which the poison is made I found in the mountains of the Ahl Oor Sungeli, and at Aden I had a small quantity of poison prepared by a cunning Rahini, in my own house. Its effects on an animal are instantaneously fatal, and I have been repeatedly assured that on a human being the poison has equal power, causing the hair and nails to drop off, and the sufferer to die in less than half an hour. The only cure is immediate excision of the part wounded, and the number of ghastly scars visible on the bodies of the Somalis amply testifies to the dread in which the poisoned barb of the arrow is held amongst them.

This poison I imagine to be the same as that described by Major Sir W. Cornwallis Harris, in his work on South Africa, when speaking of the arms of the "Burhman," except that amongst the Rahinis the juice of the euphorbium is not made use of.

The last branch of the western tribes is the Haber-tel-Jahleh, who possess the sea ports from Seyareh to the ruined village of Rukudah, and as far as the town of Heis. Of these towns, Kurrum is the most important, from its possessing a tolerable harbour, and from its being the nearest point from Aden, the course to which place is N. N. W.,—consequently the wind is fair, and the boats laden with sheep for the Aden market pass but one night at sea, whilst those from Berbera are generally three. What greatly enhances the value of Kurrum, however, is its proximity to the country of the Dulbahanta, who approach within four days

* This was seen by Commander Campbell and myself when inland from Berbera; and Bruce again has spoken only the truth.

of Kurrum, and who therefore naturally have their chief trade through that port. The Ahl Yusuf, a branch of the Haber-tel-Jahleh, at present hold possession of Kurrum, and between them and the tribes to windward there exists a most bitter and irreconcileable feud, the consequence of sundry murders perpetrated about five years since at Kurrum, and which hitherto have not been avenged.

The small ports of Enterad, Unkor, Heis, and Rukudah, are not worthy of mention, with the exception of the first-named place, which has a trade with Aden in sheep, and leaving the Haber-tel-Jahleh at Heis, therefore, it remains but to notice the ancient settlement of Meyet, the burial-place of the founder of the Edoor nation, and their present limit to the eastward. Meyet is situated on a small plain bounded on the South and S. W. by the western extreme of the lofty mountains of the Ahl Oor Sungeli, which here approach within two hours of the sea. From Meyet a large quantity of white ebony is exported, as also a long and thin rafter used both at Aden and on the Coast in the construction of native houses. The hills immediately over the town afford a large supply of very fine gums, and the place carries on a considerable trade with both Aden and Makulla.

The stranger is at once struck with the magnitude of the burial-ground at Meyet, which extends for fully a mile each way. Attachment to the memory of their forefather Isaakh yet induces many aged men of the western tribes to pass the close of their lives at Meyet, in order that their tombs may be found near that of their chief; and this will account for the unusual size of this cemetery. Many of the graves have head-stones of madrepore, on which is cut in relief the name of the tenant below; and of these many are to be found 250 years old.

In my notice of the western tribes, I have made use of the word Edoor to distinguish the descendants of Isaakh from those of his fellow-countryman Darrood, but it may be as well to observe that the western tribes are avérse to the appellation, and invariably correct the person who styles them Edoor, by telling him that they (the Edoor) are the Galla tribes. The Mijirtheyn told me that the Galla family into which Sheikh Isaakh married was called "Durr," and from that is derived the name of "Edoor"; and the Haber Gerhajis, on the other hand, retaliate by quoting "Darrood" as an offshoot from the same pagan source.

I found it impossible to obtain any estimate of the number of their tribes, but the population in the interior is doubtless very great. The

advantage that is almost universally taken of the liberal allowance of wives sanctioned by the Prophet, and the prolific character of the Somali females, is of itself a strong argument to that effect; but it would be idle to attempt to put down any fixed number as the population of this part or N. E. Africa, and I much doubt if all the tribes were computed separately, from report, whether we should even then obtain an approximate of the truth.

With this brief memoir of the Somali Tribes to the Westward of the town of Meyet, I now beg to offer what information I have been able to gather relative to the Southern Tribes bordering on the river Webbi.

To the South and S. S. West of Berbera, on the road to Hurrur, the kafilas pass through the country of the Burtirrhi and Girrhi, the two most western branches of the family of Darrood. Of these two tribes little is known. The Emirs of Hurrur have for many years intermarried with the Burtirrhi, and this gives them a certain degree of influence, but they no not visit the sea coast so commonly as the other tribes, and appear to be a pastoral race, occupied solely in tending their flocks and herds, and in planting the coffee tree on the low ranges south-east of Hurrur.

They are bordered on the S. E. and E. by the province of Agahdur, —a country of considerable extent, bounded on the south by the Webbi, and on the east by Murreyhan. From Berbera to Agahdur is nine days, of which I am assured that four are without water. The fertile valley of the Nogál passes Agahdur on its northern side; and throughout the province generally the ground is cultivated, and large quantities of white jowari is grown, forming the common food of the people.

Agahdur is stated to be a level country, possessing excellent pasturage for cattle, with abundance of water, which is procured by digging wells six to eight feet in depth. The soil is remarkable for its redness, but the purity of the air is highly extolled. From the number of their flocks and herds, the inhabitants, as might be expected, export large quantities of ghee from Berbera, and carry on a regular trade with the Galla tribes to the southward of the Webbi Shebeyli, through the intervention of the people resident at Gunana, who act as brokers on the occasion. The goods carried down for barter are white and blue cloth, cowries and beads, on which last an enormous profit is realised. The gums are purchased by the skin of sixty lbs., ostrich-feathers by the pound, and ivory by the frasila of twenty lbs.—if of large quality, and good of its kind.

The Galla tribes are described as a nation to be trusted if once an acquaintance is formed. They appear to understand cultivation of the soil, and produce immense quantities of jowari, which is retailed at a cheap rate on the east coast of Africa at the ports of Mukdesha, Juba, Putta, Lamoo, &c., and thence exported to Hadramant. Bruce mentions the river Webbi Gunana, or Jub, as the Yas, or Webbi; and as an additional instance of his general veracity as a traveller, I may mention, that on my enquiring about this name from the Somali who recently had returned from the river, he told me that it was occasionally termed so from the stream being full of "Yahass" or alligators, rendering its navigation on a raft highly dangerous. From the word "Yahass," Bruce doubtless derives his name. It is now well known that "Webbi," in the Somali language, means a river, whilst Kebber or Kibbee signifies the bed of a river in which pools of water are found. After a long search after it, I found, by accident, that the river "Durdur," said to exist four days' inland from Burnt Island, meant, in the language of the country, a "running stream," but no river; and doubtless, as our acquaintance with this part of the country increases, we shall find that the confusion now existing relative to the "Webbi" will be satisfactorily cleared up, and the number of rivers laid down in Mr. McQueen's map reduced to two only—the Jub, or the Webbi Ġunana, and its northern brother the Webbi Shebeyli,—the three smaller streams running between them not being worthy of mention.

Agahdur is governed by a Chief who takes the title of Oghass, but who, like all other Somali Chiefs, can boast of little save the name. Horses are described as being abundant, and very cheap; camels equally so. The country, by all accounts, is safe, and the climate healthy; and a journey through Agahdur, down to Gunana, or down the Wadi Nogál, would amply repay the traveller. Amongst the families of Darrood, Agahdur ranks as second; but in numerical strength, and extent of country, it would probably take the first place.

Of Murreyhan* but little is known. Bordering as it does on the Haweea tribe, who are a different caste of people to the Somalis, they are not looked upon with much consideration, but their country must abound in gums, myrrh, and ivory. The valley of the Nogál borders upon them, and they are separated from the sea by a belt of country occupied by the tribe of the Haweea,—the first connecting link between the Somali and the Seedie of the coast of Suwahhil.

* Murreyhan—a pompous man, a boaster.

Murreyhan cultivates no grain, and is separated from the Shebeyli River by the Haweea again. Kafilas from this province annually arrive at Berbera, bringing the best of myrrh, and the finest ostrich-feathers and ivory. Their breed of horses is highly esteemed, and I believe that a traveller might penetrate the country with ease, provided he took the precaution of being passed from tribe to tribe,—a measure indispensable amongst the Arabs, and highly desirable amongst the more savage inhabitants of north-east Africa.

Between Murreyhan and the country of the Ahl Oor Sungeli lie the great pasture ranges of the Dulbahanta,* a level country, abounding in grass, water, and timber, and without a stone. Unlike their other brethren, the Dulbahanta are a nation who fight chiefly on horseback, their arms being two spears and a shield. Their horses are powerful and courageous, —the breed descended, according to Somali tradition, from the stud of Suleiman the son of David, and consequently highly valued. The Dulbahanta, as far as I have seen of them, are a fine martial race of men, second to none of the branches of Darrood either in conduct or appearance, and they are described as being courteous and hospitable to the stranger who visits them. They have generally two Sultans, or Gerads, the elder of whom, Mahomed Ali Harrâin, governs the eastern limits of the province; whilst his colleague, Ali Gerad, (recently deceased) guards the N. W. frontier from the thieving Haber-tel-Jahleh in the neighbourhood of Kurrum and from the Agahdur family of Noh Amor.

The Dulbahanta have no grain whatever, and subsist chiefly on milk alone, save when want of rain renders it necessary to thin the countless flocks and herds that roam over their boundless prairies. They have but few gums, but they bring down ivory, ostrich-feathers, and ghee, in abundance. Wild beasts are numerous—the lion especially so. The cameleopard (Somarilice, geerhi) is found on the grassy plains trending down to the southward from the stupendous mountain chain of the Jebel Ahl Oor Sungeli; and the koodoo, the onyx, and the black rhinoceros, are also common in the same neighbourhood.

North of the Dulbahanta, the country, for so great a distance level, begins to rise gradually. The grassy plains become more rocky; small limestone ranges are passed; until at last the level plateau of the Jebel Ahl Oor Sungeli is attained, when the traveller, from the dizzy brink of Eyransid (the cloud-bearer,) looks down a steep precipice of 1500 to

* Dulbahanta—outnumbering and excelling all.

2000 feet, and sees the villages of the Ahl Oor Sungeli dotted along the sandy sea coast 6500 feet below him.

This magnificent range, so aptly named, and rising in solemn grandeur about twenty-five miles from the sea, had long been looked at from a distance by me; and a visit to the Gerad, or chief of the Ahl Oor Sungeli, in February, 1848, afforded me the opportunity so long coveted of visiting them. Between Mahomed Ali Gerad and myself frequent friendly letters and messages had passed, by means of the boats that touched at his ports on their way to Aden, and during this, my first, interview with him, he appeared anxious to get "his name written in the good books of the English" as his Mijirtheyn brothers had done. An assurance that I might go anywhere I pleased over his country, was caught at on my part with a readiness that appeared rather to alarm him, but seeing that my tent and travelling kit was already on its way to the shore, he apparently thought it useless to argue the matter or magnify the perils of the road. By the following afternoon we had left the town of Ras Kori, and, taking a small guard of elders from his own tribe, we bid His Majesty an affectionate farewell, and turned our steps in the direction of the lofty barrier range of Eyransid.

An hour's sharp walking took us some distance up the bed of a water-course having a general southerly direction, and the night was passed in a small clearing under the cliff. At sunrise the march was resumed, and, passing some three to four miles up the same water-course, in which we observed several large monkeys and some remarkably fine antelopes, we crossed a low shoulder covered with gum trees, amongst which we found the myrrh, and had an opportunity of collecting a small portion of its gum. It was the same tree as that sent down by me to Bombay some years ago, and the only one, as I was assured, affording the myrrh of commeree. Entering the bed of the mountain torrent a second time, we observed the broad-leafed luban tree (meyeti), the wadi and adadi species of the gum arabic, and large specimens of the harraz, or baabul tree. The sides of the water-course were regularly-disposed strata of fine and coarse gravel, interspersed with huge boulders of limestone. Fragments of porphyry were frequently picked up, and small quantities of pure white marble. Shortly before nine we reached a pool of water in the bed of the mountain torrent, which had a decidedly bitter taste, similar to that before described at Bheeyeh Ghora. The temperature was pleasant, not exceeding 81° under a tent at seven A. M. The general direction of the water-course during this march was north and south.

By three in the afternoon we were once more on our way. The ascent became very steep, and we now came upon large fragments of iron-stone, interspersed with lava and black basalt: small masses of red ochre were common, as also hardened clay; and the frankincense tree now began to be very abundant. A most fatiguing ascent of two hours exhausted man and beast, and, too tired to trouble ourselves about the tent, we lay down on the mountain side under the lee of an ancient burial-ground, and with the thermometer down to 65°, and the clouds rolling round us, were drenched to the skin with the dew.

The hour for morning prayer found us packed up and on our road. For three hours we crossed over undulating hills, every mile rapidly increasing the elevation. The dragon's-blood tree now appeared in abundance, and, from my former experience amongst the Mijirtheyn, I was not surprised to find that its value was unknown in the Oor Sungeli country. The "bochain" of Socotra, a peculiar tree found also in Aden, but I believe possessing no generic name, was seen on every side; and another extraordinary specimen, like a gigantic bulb of three to four feet in diameter, with a few small sprouts not worthy of the name of branches, springing from its top, attracted our attention, at an estimated height of 4000 feet. We halted during the heat of the day, with the thermometer 76° at noon. The country now began to assume the general character of a limestone range. The water-course that we had left the day previous was to be seen winding its way into the ravines of the high range, and here and there a cluster of white limestone slabs pointed out the site of an ancient graveyard.

At three P.M. the ascent was resumed. The country became more thickly wooded, and more beautiful, as we advanced. The track of the rhinoceros warned us to have our rifles in readiness, and before sunset we pitched on a small level spot of ground, about 1000 feet below the peak of Eyransid. A stream of delicious water was found within half a mile of the tent, the only drawback upon which was that it abounded in small leeches, which rendered it necessary to be cautious in drinking without due examination. The tree, from the root of which is made the poison for the Somali arrow, was here pointed out to us, and I have now with me a piece of it. Here, as in other places, extensive burial-grounds were observed, but, owing to the long drought, the people had retired to the mountains further inland, and, had we not taken the precaution of driving a few sheep with us from the sea, we should have been on very short-commons indeed.

Sunday morning afforded us a rest, but in the afternoon we pushed on for an hour, passing on our road many places where the track of the rhinoceros was recent. The cactus appears to be the favorite food of this animal, for we found many trees torn down and half eaten also. A beautiful red flower, too delicate to preserve, was here first observed. Specimens of red ochre, and fossil shells filled with the same, were to be picked up at every step; and the gum arabic had now replaced the luban or frankincense tree. Before sunset we halted on a plain immediately below the summit of the mountains, and were honored with the presence of the sister of Mahomed Ali Gerad, who, in company with a relation, was travelling to her home in the Wadi Nogál. The night was bitterly cold, the thermometer shewing a temperature of 48°, and the dew falling like soft rain. An occasional howl from the jungle warned us that leopards were to be found in the neighbourhood, and kept our Somali conductors on the qui vive; and we were not sorry to re-commence our journey at sunrise.

Sending the tent round by a more practicable road, we scaled the almost perpendicular cliff, rising some 750 feet above us, and by eight o'clock found ourselves on the summit of Eyransid, 6500 feet above the sea, and the first Europeans that had ever placed foot on the soil.

To describe the grandeur of the prospect before us is impossible. Range after range lay stretched like a map at our feet, and the view was bounded only by the ocean. The towns of Ras Kori and Sohm were to be seen dotted on the glaring sandy shore; and the *Euphrates* lay like a speck on the water. At noon the thermometer stood at 64°, and the sand driving past and below us, warned us to prepare for a cold night. As the afternoon advanced, the clouds packed heavy and thick below us, and the rocket and blue-light fired to notify our safety to our friends on board were consequently not seen at the ship.

To our surprise the temperature during the night was not so low as on the plain 800 feet below us—the thermometer standing at 52°: warm clothing was however indispensable, and our Somali guards peevishly remarked, that though we were always wishing for cold weather we did not appear inclined to benefit by it, judging from the blankets &c. that we were glad to creep under. As they had but a single cotton cloth themselves, some little excuse might be made for them; and a venerable old ram, purchased the next morning from a passing Dulbahanta Somali, restored them to their good honour. We spent the following day in

wandering over the level plateau forming the summit of the range. The wild fig, twenty-five to thirty feet in height, was thinly scattered along the ridge.

The dragon's-blood tree was observed twenty-six inches in diameter, and eighteen feet in height. The ebony was plentiful, but of small size. A tree similar to, and possibly the lignum vitæ, attracted our notice; and cedar trees, some of them twenty-four inches in diameter and twenty-five feet high, were common. In cutting the cedar we observed that the wood which appeared to be growing had no scent, and was nearly white, whilst the more aged branches, that apparently bore no leaf, were of a very deep colour, and had a very strong perfume. The wood is neither prized or used by the Somalis.

Various and very beautiful wild flowers were scattered over the plain. The aloe of Socotra was abundant, and of good quality, but not used or known by the people. Many species of euphorbium and milk-bushes were seen, but no frankincense or gum arabic.

The summit of the range is composed of tabular masses of limestone, covered with small nodules, and very cellular, thereby rendering walking most uncomfortable, from the sharpness of the rock. At one point that we visited, a most magnificent natural wonder presented itself to us. A column of rock, of perhaps fifty feet square, had, by some convulsion of nature, been separated from the mountain side, and stood alone, a mighty pillar of 1500 feet in height, without hardly a break or irregularity in its sides, so straight had been the fracture. Trees, and the grass of years, remained on its summit untouched, the intervening fifty feet forming an impassable gulf; and at its foot, deep caverns went in far beneath the parent mountain, through whose windings a stone thrown down from above could be heard to reverberate long after it had passed from sight.

A second night of cloud and fog prevented again our communication with the brig by rocket or blue-light, but the "siraj," or light of the English, will long be held in remembrance by the Ahl Oor Sungeli, who could not sufficiently admire the one or the other. "You are the kings of this world in wisdom," said the solemn Mahammood Abdi, "and what are we in comparison? Thank heaven our world is to come!"

After a two days' stay in this delightful climate, we commenced the descent by the former route, intending to spend a day at the water 1000 feet below, and examine the frankincense trees in the neigbourhood.

Scrambling down the rock we passed many beautiful aloe trees of twenty feet in height, having several branches, and bearing a beautiful scarlet bell-flower, of the size and shape of the fox-glove. The aloe plant—the Socotra species—observed on the summit, bore a yellow flower, and of a different shape altogether. The camels that had been sent round as before, joined us with the melancholy tale of two of our sheep having been wounded by a leopard on their way down, and their having been obliged to cut their throats in consequence. Time unfortunately was too valuable to be lost, and we were compelled, though very unwillingly, to leave the culprit unpunished.

We halted at the water, under the shade of some gigantic fig-trees, laced together by an enormous creeper of some hundred feet in length, and probably caoutchouc trees. Rock partridges were here found, but no animals save Salt's white antelope, and hungry hyenas, who during the night made a meal off one of our water-skins. The frankincense found on the rocks over this spring was of the large leaf kind, known by the name of meyeti, and not much prized; but independently of gum arabic and frankincense, there were many other gum trees for which we could find no name. Of these, one, a specimen of which I brought to Aden, is, I feel sure, gum elemí; and another variety was shewn to us, the gum from which was used by the Somalis to cleanse the hair. To a botanist, these mountains would afford an inexhaustible field for research, and it is much to be hoped that the flora of the Somali coast may ere long be described in the manner that its beautiful varieties deserve.

On our return to Ras Kori, the chief town of the Ahl Oor Sungeli, we found that our unaccountable proceedings in the mountain range had excited much alarm. Amongst other wonderful stories, our having found the gold tree was confidently asserted; and it was significantly remarked that the English, by carrying away stones and trees from Aden when they surveyed the harbour, were enabled to capture the place afterwards with ease. Fearful, however, apparently of giving offence, the chief refrained from questioning us, and allowed us to repair on board without the slightest demur at the prices or presents that we thought sufficient recompense for his trouble.

The country of the Oor Sungeli may be described as a lofty plateau of limestone mountains, precipitous to the north, and gradually sloping to the south,—forming in fact a gunner's quoin. Between the mountains

and the sea, undulating ranges occur, intersected by ravines, and thickly wooded; whilst the belt of level ground near the sea is thinly sprinkled with bushes, and exhibiting a plain of white sand. The Oor Sungeli country extends from Bunder Zeyadeh to Bunder Jedid.

The tribe is powerful and warlike. Brothers of the Mijirtheyn by the same mother, they generally coalesce should war break out, but petty feuds and plunder are of frequent occurrence.

The Oor Sungeli are divided into several clans, of whom the following are the most important:—1st, Gerad Abdullah, the royal branch, from which the title of Gerad or chief descends by hereditary right. They reside on the sloping southern side of the great mountain range of Eyransid, or the "cloud-bearer." 2nd, the Noh Amor, who are found at Bunder Jedid. 3rd, Ogeiss Lubba, to whom belong two out of the three villages of Ras Kori. 4th, Aden Seyd, at the village of Galm, and the mountains above. 5th, Mayedth, resident at Doorderi. And lastly, the numerous clan of "Dubeiss," who occupy the towns of Elayeh, and extend to bunder Zeyadeh, where they join Mijirtheyn.

The Sultan Gerad Abdullah had three wives, who bore the three families of "Bha Mijirtheyn," "Bha Edoor," and "Bha Ogeiss Lubba." The present chief is of the Bha Mijirtheyn, or eldest, branch, and has now ruled for about three years. His power appears to be very great in some respects, and the sight of his baton, an ivory staff, is sufficient to collect the tribe in the event of war. But the chief to whose standard thousands would at once readily flock, dares not so much as fine, still less beat, any man of his tribe, unless supported by his elders.

The Oor Sungeli have numbers of horses, and of a good breed. With the exception of the tribe of Dubeiss, the arms used by them are the two spears and shield. The Dubeiss are nearly 5000 strong, and fight with the bow and poisoned arrow alone. It is worthy of remark, that in this tribe theft is looked upon with abhorrence, and though, in the event of a wreck, the natives would doubtless consider it fair to plunder, still, during my stay amongst them, though many a tempting opportunity of pilfering occurred, not an article was lost. To call a man a thief is a deadly insult, to be washed out by blood alone. Pity is it that the Somali tribes of the Edoor have not the same prejudice in favor of honesty.

* Bringer of good news.

It is a mistake supposing that the high ranges produce the best frankincense. As before stated, we found no luban trees on the summit of Eyransid, though at an elevation of two to 3000 feet they were abundant. The traveller in crossing the Somali country generally is struck with the appearance of boundary lines dividing the hills into portions. These landmarks have existed probably for centuries, and serve to denote the limits of each family's gum-trees. In the Oor Sungeli tribes, we were assured that the gum-trees were never planted, but increased in course of nature. In the Mijirtheyn country we observed several young trees that had been transplanted, and we were then told that in some districts the trees were regularly cultivated like the coffee, and, naturally, the produce was increased seven-fold.

Frankincense, myrrh, sumuk or gum arabic, shenneh (orchel,) and ghee, form the exports of this tribe, and a peculiar kind of gum called "telleh felleh." I could not find the tree producing this gum, and I can hardly fancy, from the specimens in my possession, that it is the Persian fulay falah, the fruit of the aloe tree, as Richardson gives it in his dictionary. It is imported into Aden in large quantities from the coast, but the merchants cannot tell me the use made of it.

The graves found in the Somali country generally, and especially amongst the tribes of the Ahl Oor Sungeli, are remarkable for their neatness, being built of while slabs of limestone, almost marble, and surrounded by a circle of stones, the space within being neatly gravelled; but at Bunder Khor, in the Mijirtheyn territory, and in the neighbourhood of Berbera, very ancient graves are found consisting of a heap of stones, frequently seven to eight feet in height, and fifteen to eighteen feet in diameter at the base, hollowed in the centre, and with no head-stone; similar in all respects to those described by Mr. Richardson in his "Travels in the Great Desert of the Sahara." They are, I fancy, relics of the Galla tribes, who once resided on the coast, but we could obtain no information regarding them.

To a traveller wishing to ascend the mountain ranges of the Jebel Ahl Oor Sungeli, I should recommend the small port of Doorderi, to the eastward of Ras Kori, as the best starting point. The mountain spurs there approach nearer the sea, and there is not the same scarcity of water: moreover, that part of the mountain district called Minneh, on which the people throughout the year keep immense herds of horned cattle, lies in his way. I do not anticipate any difficulty being thrown in the way by

the chiefs, nor would the journey be very expensive; whilst the bracing climate, pure air, and magnificent scenery, must prove most advantageous to an invalid.

The Mijirtheyn Tribe has already been described by me in a Memoir forwarded to Government in 1843, and on looking over my notes, I do not find it requisite to make any alteration, excepting in one or two minor points. The luban meyeti is described as being the most valuable species of frankincense, which I have since ascertained not to be the case; and again, where the Mijirtheyn tribe are spoken of as inferior to the Western Somalis. A few years more experience has proved to me that the Mijirtheyn and Ahl Oor Sungeli tribes are immeasurably superior to those of the Edoor, and, though given to plunder a wreck, (a fault sometimes found in England), they will not rob the stranger of his own private property, and life is safe amongst them. With this very brief tribute to the manly character of the Mijirtheyn, I will now pass on to Ras Hafoon, the southern extreme of my wanderings on the Somali coast.

Ras Hafoon, or "the surrounded," is in the Mijirtheyn territory, and tenanted by Aial Fatha branch of the family of Othman. It consists of a nearly square headland of 600 to 700 feet in height, formed of sandstone and limestone. The outer edge of the peninsula is perfectly flat and tabular, and the interior consists of undulating hills, deeply intersected by ravines and the courses of mountain torrents. It is connected with the mainland by a long narrow neck of white sand, shells, and mud, with a few stunted bushes thinly scattered along it; and from its being thus almost an island, I imagine it takes its name Hafoon.

The southern bay is of course the best adapted for ships during the strength of the N. E. Monsoon, but a change of two or three points in the direction of the wind to the eastward causes a swell to roll in, and a surf to break on the beach. On our arrival there we found a few miserable Somali huts, and a population of perhaps fifty people, who offered ivory, ostrich-feathers, ambergris, and fish-teeth, for sale. The bay is much frequented by the shark-fishers from the Arabian coast, many of whom reside here throughout the year, merely moving their fishing-craft to the other side of the isthmus as the monsoon changes.

A walk of seven or eight miles brought us to the N. W. front of the cape, whence we embarked in a very crazy boat for the mainland. The bay, when we crossed, was too shallow for anything but very small ves-

sels, and I feel confident that a ship would not be able to ride in safety through the S. W. Monsoon, owing to the heavy swell that must roll round the point, and the violent gusts of wind blowing across the headland. This northern bay, or Khor Hoordea, I should imagine to be the most unhealthy spot on the Somali coast. Its shores and the bottom of the bay are covered with decomposed vegetable matter, which, on being disturbed, gives forth a noxious gas that is perfectly sickening, and in which the unfortunate traveller who longs for a bathe sinks leg deep; and yet we found many fishermen living on the sea shore, who, from long habit, had become accustomed to these exhalations, and wished for no better place.

We pursued our way for about nine miles to the Lagoon of Haudah, passing over a flat country, composed almost entirely of coral and limestone, and evidently at one time covered by the sea. At Haudah, to our great disappointment, we found the Lagoon salt water, except at its head, where it was barely drinkable. A well of good water was however found a few yards higher up, which shortly was crowded by the flocks and herds from the wooded plains inland of us. Our very uncommon appearance, the tent, and our baggage, occasioned unbounded astonishment to the natives, who poured in on every side, but no incivility was offered, and no article of our baggage was missing when we prepared to start on the following day. Milk was brought to us in abundance, which was paid for in blue cotton cloth; and sheep were equally attainable. Hafoon, however, like the whole Somali coast during the early part of 1848, was suffering from long-continued drought, which had occasioned much misery amongst them.

During the time that the French surveying vessels were anchored in the southern bay, in 1846, their crews cleared out one of the few wells found there, and thus procured a supply of good water. The other wells were brackish and bitter, and became deteriorated by constant use. In the northern bay, or Khor Hoordea, we found no water at all, but at the bottom of the bay, at a place called Khor Hashera, we were told that a stream of water ran into the sea. It is possible that the river mentioned by old writers as existing in the neighbourhood of Hafoon may be this stream, and Khor Hashera the ancient Opone.

During the S. W. Monsoon, a kind of fair, similar to that at Berbera, though much smaller, is annually observed at Khor Hoordea. The merchants from Maculla, Shahr, and from the Mijirtheyn Bunders to

the northward and westward, attend this meeting about the end of May, when their bugalas are hauled up on the beach, and a brisk trade is carried on throughout the S. W. Monsoon, in gums, ostrich-feathers, hides, ivory, and ghee. Large quantities of ambergris are also brought for sale, and the price demanded is very great. Elephant hunting is followed by those who have guns, and last year upwards of thirty-five were killed by a party of gun-men brought by a speculating Somali from Brava, on the coast. A good trade might be carried on between Mauritius and Hafoon in donkeys. These could be procured at Hafoon in great numbers for five to six dollars each, and I should imagine consequently that the speculation would answer well, especially as the voyage would be so short in the N. E. Monsoon.

ADEN, 12*th May*, 1848. (Signed.) C. J. CRUTTENDEN, *Lieutenant, I. N., Assistant Political Agent, Aden.*

(True Copy.) A. MALET, *Chief Secretary.*

ART. IX.—*A Narrative of a Voyage in search of the Crew of the Ship "Charles Eaton," performed in the year* 1836. By Commander G. B. Kempthorne, I. N.

[Communicated by the Author.]

ON the 6th March, 1836, sailed from Bombay as 2nd Lieutenant of the Honorable Company's Brig of War *Tigris*, on an expedition to Torres Straits, in quest of the unfortunate Crew of the ill-fated Ship the *Charles Eaton*, reported to have been seen on some Island between New Guinea and New Holland, and supposed to be detained in slavery by the natives.

The first place we intended touching at was one of the Cocos or Kulling's Islands, a small group, lying in the parallel of 14° S. and meridian of 93° E., said to be occupied for some years past by a Mr. Ross and family, who is endeavoring to cultivate the soil, and trying to establish a traffic in coir and cocoanut oil. Several Malays, together with their wives and children, have also located there, and materially assist the above gentleman in his spirited undertaking. Good water is plentiful, and large quantities of vegetables, maize, and some fruit, are grown: pigs and poultry are likewise very abundant: so that they have not only a sufficiency of food for themselves, but an ample supply for ships also, should

they call, which can be obtained at moderate prices. I am surprised that advantage is not more frequently taken of this useful and thriving little colony, lying as they do in the track of ships homeward from, and outward bound to, China, Manilla, and Java. Prior to Mr. Ross's settlement on this cluster of islets, they were quite uninhabited, and were but little known to the navigator; and to this day even are rarely visited: it is, however, to be hoped that such enterprize may ultimately be crowned with success.

The Islands are purely of a coraline formation, and are very low,—elevated only a few feet above the sea, surrounded by reefs rising like a wall from an unfathomable depth, with many gaps or passages between, where a vessel might enter and find safe anchorage amongst the numerous lagoons within. They are all covered with a variety of trees, but the cocoanut-palm, (as similar in the Maldives) mostly abounds. They are just within the influence of the S. E. trade, so that the climate, from this cause, is rendered mild and healthy; the thermometer scarcely rises above 84°, and rarely falling below 75°.

The information which I have above detailed was principally derived from some of the officers of the H. C. Sloop-of-War *Coote*, who visited this interesting colony in the year 1831; and my now referring to it, I trust will not be thought out of place.

For several days after quitting Ceylon, we experienced light variable airs, with calms, and a current setting to the southward and eastward, at the rate of twenty-four miles per diem; nothing worthy of notice occuring till the 4th of April, when we were enlivened by the sight of a most glowing sunset,—such an one as Claude Lorraine would like to have feasted on. It had continued a calm the whole day, and the sea was unruffled and still as water in a crystal vase, the vessel resting on its mirror-like surface without any perceptible motion. The sun, as it sunk beneath the horizon, cast its retiring rays on the large massy clouds which hung floating on its verge, reflecting back the most brilliant tints, and exhibiting, at the same time, the most picturesque forms: not only were baronial castles with their battlements rising out of a forest of purple and silver-tinted trees plainly seen, but even ships, abbeys, monastic buildings, delapidated towers, and gorgeous palaces, with colonnades of burnished gold, could also be depicted to our somewhat fanciful imagination; and as the glorious luminary wholly disappeared, it shot forth diverging rays of red, orange, violet, and pink, reaching to the

very zenith; and at last, the whole, gradually merging into a deep crimson, imparted to the glossy ocean such a tinge that it resembled a burning fiery lake. As night advanced, these brilliant colors became fainter and fainter, the fleecy nebulæ lost their romantic forms, until at last "the cloud-capped towers, the gorgeous palaces, the solemn temples, "soon dissolved, and, like the baseless fabric of a vision, left not a "wreck behind." Never shall I forget the impression this sublime scene left on my mind, and, as I stood gazing upon it, could not help exclaiming,—how paltry and insignificant are the labors of man, when compared with works of the Great Architect of the Universe!

On the 12th, crossed the line in longitude 91° 30′ E., the tedious light winds and currents continuing until the 18th, when the south east trade set in in latitude 4° S., commencing in one of the heaviest squalls I ever remembered: so violent was it, that it nearly tore the masts out of the brig, and laid her over on her beam ends: fortunately it only lasted a short time, and did no material damage. It was accompanied by a vivid flash of lightning, which fell like a ball of fire, enveloping us in one sheet of livid sulphureous flame, and nearly blinding every one on deck by the intensity of its glare. The peal of thunder which followed was like the explosion of some vast mine, or the bursting forth of a volcano—it shook the little craft from stem to stern, and made everything tremble; the clouds poured down their burdens in such torrents that it seemed as if a second deluge had arrived. The weather, however, in the morning, was somewhat more propitious, though still in an unsettled state, which continued without change throughout the S. E. trade. In consequence of this circumstance we were prevented from visiting the Cocos for a fresh supply of water, and were obliged to shape our course to the southward.

On the 4th May lost the S. E. trade, in latitude 31° 43′ S., and longitude 88° 7′ E., and at 10h. 30m. of that day passed the carcase of an immense whale, resembling a small vessel keel uppermost. The gig was lowered, and I went to examine it: the effluvia, as the boat passed some distance to leeward, was intolerable. The dimensions of it were found to be as follows, viz., thirty feet long, twenty wide, and about ten in depth: the greater part of the body was missing, but from what remained it was evident it must have been a very large fish. Immense shoals of albicore, boneta, and sharks, together with innumerable birds, such as the Cape hen, pintardo, and albatross, surrounded it, and were quietly feasting on this dainty morsel; and so occupied were they, that even the

approach of our boat did not disturb them, or put them to flight: many albatrosses allowed us to attack them with our oars and the boat hooks, and several were consequently knocked down and killed.

Light N. W. breezes now prevailed, accompanied by a long south-westerly swell, which continued until the 11th, when the wind suddenly shifted to the southward, and blew a hard gale for several hours, which obliged us to heave to under a close-reefed main-top-sail, and fore-top-maststay-sail—a high confused sea running, vessel rolling heavily at times; sent down top-gallant-yards and masts, made all snug and prepared for bad weather: dark threatening appearance all round, raining and very cold, thermometer standing at 46°; the lascars and sepoys of no use, and we could not get them to work aloft, their fingers being quite benumbed; obliged to issue out spirits to them the same as Europeans, otherwise many would have died. On the evening of the 12th the storm moderated, and we were enabled to carry more sail, and to stand on our proper course, though the weather still continued unsettled and cloudy, with frequent heavy squalls, and a long S. W. swell. On the 13th, in consequence of the severity of the weather, and intensity of the cold, one of the sepoys died. These strong westerly gales prevailed until the 25th, when the wind veered round to the N. Eastward, and blew a strong gale from that quarter, which rendered it impossible to beat through Basses' Straits, and consequently we bore up for Hobart Town. At noon passed King's Island, the extremes bearing N. 20° E. to N. 55° E. This island is moderately high, and is covered with pine trees. A few huts or cottages were seen on the sides of the hills, which we supposed might be inhabited by whalers and fishermen.

On the 27th sighted the Eddystone Rocks, bearing S. 64° W., and Tusman's Head N. 4° E. The land here is very mountainous, exceedingly picturesque, and clothed with forest trees as far as the eye can reach,—the summits of the hills being completely capped with snow.

The next day at 3h. 30m. came to anchor off Hobart Town in thirteen fathoms—blue clay—three-quarters of a mile from the Government jetty.

Hobart Town is situated on the river Derwent, about fifteen miles from its entrance. It is rather an extensive and well laid out town, and can boast of many fine public buildings, and several good shops and streets: it reminds one of a neat country town in England. We observed many rural cottages covered with roses and creepers, and tasteful gardens in front. I am sure I could never fancy myself at the most distant extre-

mity of the globe. They have several places of public worship. The female penitentiary is situated about two miles to the northward of the town, in a romantic valley, with a purling stream running through it. It is a large building, capable of containing about 800 female convicts; but when I visited it not more than 250 were within its walls. Everything was particularly clean and well arranged, and the system appears to work well. The Government House stands on a gentle declivity, in the midst of a shrubbery sloping gradually to the water's edge, the entrance on the left hand side going up Macquarie Street. It is a large rambling pile of buildings, and cannot boast of any particular style of architecture; it however commands a fine and picturesque view of the surrounding country, and the harbour, which here forms a magnificent estuary, with the shipping laying quietly at anchor on its still surface. Mount Wellington rises at the back of the town, distant eight miles. It is about 4000 feet high, and defends the town from the westerly winds, which at times rolls over the mountain in tremendous gusts, sweeping all before it. The sides are covered with trees, reaching even to the top, altogether forming an imposing appearance, the summit now being enveloped in snow. In summer it has many visitors, who make excursions to the top to enjoy the exhilarating and refreshing breeze. Through the town runs a stream of water, which not only turns several mills, but keeps up a constant supply of water during the height of summer.

During our stay at this place the weather was at times very cold, the wind being chiefly from the S. Westward, with frequent showers of rain and sleet, the thermometer ranging from 38° to 46°. Notwithstanding all these disagreeables, we were much pleased and gratified with our short visit, for nothing could exceed the kindness and hospitality shewn us, not only by the officers of Her Majesty's 21st fusiliers, and the principal inhabitants, but by the Lieutenant-Governor, Colonel Arthur, who rendered us every assistance, and did all in his power to expedite the departure of the *Tigris* on her important mission. The scurvy, which had made its appearance on board, by judicious treatment, and an abundant supply of fresh meat and vegetables, soon lost its virulence, and although several of the crew were attacked with this dreadful disease, yet none died: a week longer at sea, and I fear we should have told a very different tale. Our being short of water, and having been kept so long on salt provisions, was the sole cause. No scorbutic affections would have taken place at all had we been supplied with preserved meats and soups, but unfortunately there were none on board. The "penny wise and pound foolish" system was in this instance very apparent, for had

we lost any of the men, we should have experienced not only great difficulty in supplying their places, but should have had to pay heavy bounties to induce others to enter.

On the 7th June, bidding adieu to Hobart Town and its hospitable inhabitants, weighed anchor, and worked down that magnificent estuary the Derwent, with a strong breeze from the westward. At sunset the same evening the brig was clear out of Storm Bay, Cape Pillar bearing north, distant ten miles: darkness coming on, soon hid the rugged snow-capped mountains of Tasmania from sight.

On our passage to Sydney experienced very stormy weather, with high breaking seas, scudding for several days before a heavy westerly gale, under a close-reefed main-top-sail and reefed fore-course. On the 11th the gale increased almost to a hurricane: hove to under a balanced-reefed boom main-sail, and whilst in this position, a tremendous sea struck the vessel on the starboard broadside, which swept away the whole of our hammock nettings, burst in the ports, and nearly carried away both our quarter boats: at the same time such an immense volume of water poured down the after hatchway (the only one not battened down,) that we all thought the brig must have foundered; however, she speedily recovered herself, and afterwards rode out the gale in beautiful style. On the 12th the storm moderated, which enabled us to bear away and make sail, and at sunset that evening, Sydney lighthouse was just discernible, bearing N. 22° W., extremes of five islands from N. 37° W. to N. 8° W., and a hill resembling a barn S. 48° W., off shore about ten miles. Reduced sail and hove to for the night: moderate breeze, with dark cloudy weather, a heavy confused sea, vessel labouring greatly. At daylight the lighthouse in sight, bearing N. 82° W., off shore about six miles. At ten A. M., when nearly inside the heads, a pilot boarded and took charge of the vessel, and soon after entered the noble magnificent harbour of Port Jackson. The wind became light and baffling, which obliged us to anchor; and at two, a breeze springing up, weighed and stood for the anchorage off Farm Cove, which we reached at half past four. It being Sunday, and a lovely day, a large concourse of well-dressed people had assembled on the Government domain and Garden Island to watch us come in; the novel attire of our lascars and sepoys having, no doubt, attracted their attention, and excited their curiosity.

Whilst at Sydney we had delightful cold bracing weather, with alternate showers and sunshine, similar to the month of April in England,

the average range of the thermometer being about 50°; the wind, as at Hobart Town, chiefly from the southward and westward.

The 28th of June was a memorable day at Sydney, for there was a heavy fall of snow, which commenced at three A. M. and lasted until nine, when the breeze, which had been blowing from the southward, suddenly shifted to the N. W., and immediately dispersed the clouds: the thermometer during the time the fall took place stood as low as 30°, but the snow only laid on the ground a few hours. The beautiful white flakes, as they fell, astonished all the country lads and lasses, for they had never witnessed such a sight before; and even the oldest colonists, I believe, never recollected such an occurrence: the phenomenon was altogether unusual for this place.

On the 10th July, having refitted, and completed our repairs, quitted Port Jackson, and proceeded on our voyage to Torres Straits, experiencing strong S. E. Trade, and cloudy weather. No particular incident occurred worthy of record until the 26th, when we sighted the Eastern Fields, part of the great barrier reef which bounds the coast of New South Wales for a distance of upwards of 1000 miles, and stretches many leagues out to sea: much caution is therefore necessary, and a good look-out ought to be kept in approaching these formidable shoals, as no land is visible, and the lead is no guide whatever,—the reefs being very steep on the outer edge, and the sea fathomless.

Captain Cook's description of these extensive reefs is so faithful and so very correct, that perhaps I could not do better than quote it.

"Rocks and shoals," this able navigator says, "are always dangerous "to the mariner, even when their situation has been ascertained. In this "part of the globe they are more dangerous than in any other, for here "there are reefs of coral rocks rising like a wall, almost perpendicularly, "out of the unfathomable deep, overflowed at high water, and at low "dry in many places; and here the enormous waves of the vast southern "ocean, meeting with so abrupt a resistance, break with inconceiv-"able violence."

The Eastern Fields are upwards of four miles in length, dry in many parts, and of a crescent form, their convex side being towards the sea. When first seen from the deck, it was distant about three and a half miles, and the extremes bore from W. ½ N. to S. S. E. In passing the northern part we observed, near the outer edge, a very conspicuous rock, resembling a pinnacle, or ruined tower, rising about twenty or thirty feet

above the level of the sea, bearing S. by West, distant four miles, the latitude then being 10° S. and longitude 145° 50′ E. I have been induced to mention this remarkable rock, as it seems an excellent mark in making these dangerous reefs, for the bearing of such an object would fix the correct position of a ship, and the commander could then steer with more confidence and accuracy towards any of the openings in the Great Barriers he may be inclined to choose. This is most important; for frequently in these latitudes the sky is so overcast with clouds, that observations cannot be taken for days together. This rock has never been noticed either by Captains King, Flinders, or Horsburgh. At sunset the Captain thought it prudent to heave to for the night, and early the next morning made sail and stood again to the northward in search of Cumberland's Passage, the weather unsettled, with passing clouds and a hazy atmosphere. At nine A. M. sighted Boat Reef, the centre bearing W. by S., distant three miles, longitude by chronometer 144° 47′ E., differing from Captain King, in the position he assigns to this reef, by seven miles further to the eastward. At noon the peak of Murray's Island was just visible through the haze, bearing W. S. W., latitude 9° 53′ S., longitude 144° 17′. Steered S. W. by W., two miles, and, as soon as the Island bore W. by S. ½ S., stood direct for it, keeping about 200 yards from the western reef of the Great Barrier. At 1h. 30m. a small opening was discerned amidst the line of breakers: immediately edged away for it, W. by W., in twenty-five fathoms; and, as we neared the gap in the reefs, our soundings decreased to sixteen fathoms, altering our courses as circumstances required, from W. N. W. to N. W. by W., and at 1h. 45m. passed through the Barriers in safety by Cumberland's entrance, and anchored in uneven ground, in sixteen fathoms, white and red coral sand, about 200 yards from a patch of sunken rocks. This channel is a very narrow one, not more than a cable's length in width, and about a quarter of a mile long: it is dangerous to make, and no vessel ought to attempt it unless she can work easy, and is well manned: it requires also strong nerves, as well as firmness and decision, on the part of the commander, whilst threading his way through the intricate and perilous navigation of the Barrier Reefs. On anchoring, we experienced a strong ebb tide setting to the S. Eastward, which lasted till three P. M. The surrounding reefs were then nearly dry, and at 3h. 30m. P. M. the flood commenced, and in the space of an hour all were again covered, the current setting in through this passage at the rate of three miles an hour—the rise and fall in a short space of time being several feet.

The scene, as we approached the Great Barriers, was truly grand, and

sublime in the extreme; nothing being visible, as far as the eye could reach, but an unbroken line of boiling surf, which dashed with such force against these stupendous rocks that it resembled the roar of some mighty cataract, throwing up, higher than our top-mast heads, clouds of snowy spray, sparkling and gleaming in the sunshine like the varied colors of a rainbow. Our position appeared to be critical in the extreme, as onward and onward we hurried towards this foaming ridge, that seemed literally to tell us thus far only were we to approach and no further. No heed, however, was paid to the warning, but nearer, still nearer, we came, and, like a vessel about to be drawn into the vortex of some great whirlpool, were we rushing apparently to our destruction, for there was not a clear space to be seen in any direction, and at times the reefs were so closely skirted that not a voice could be heard above the din and noise of the waters, and we were completely enveloped in a sheet of mist, rendering everything dim and indistinct. It was most exciting, for, had the slightest mistake been made in the trimming of the sails, or in the steerage, there would have been no hope for us,—the *Tigris*, in all human probability, must have struck upon the rocks, and in a few moments more would have been dashed to pieces, and all hands have perished. But this luckily was not our doom, for, whilst in this critical position, we suddenly discerned, just ahead, a small line of unbroken water, smooth as if oil had been poured on the troubled ocean, and appearing like a narrow gap cut between the reefs, of sufficient breadth only to admit a vessel. This was, at last, the entrance to Cumberland's Passage, which we had been so long and so anxiously looking out for. The vessel's head was instantly turned towards the desired opening, and soon after she passed through it in safety, and came to an anchor within the Great Barriers—all rejoicing at having escaped, thus far, the perils and dangers of these seas.

At sunrise the following day weighed and stood for Murray's Island, distant about four leagues, steering the whole time between coral rocks and shoals, some above and some under water: they could, however, easily be distinguished by the color, the coral reefs being brown, the shallow parts a lightish green, and the deep water a beautiful cerulean blue, so that, by keeping a good look-out at the mast-head, a vessel might be safely and easily navigated through this tortuous channel. The lead is of no use even within the Barriers, the eye being the only safe guide. As we drew near the island we saw a great number of the natives on the beach waving palm branches, shouting loudly, and evidently making friendly signs for us to land. We acknowledged the compliment by showing a

white flag at the peak. At 8h. 15m. A. M. came to in fifteen fathoms, off shore about half a mile.—No sooner was the anchor dropped, than the inhabitants launched their boats, and immediately pulled off. In the space of a few minutes the *Tigris* was completely surrounded by about forty canoes, filled with naked savages of both sexes: it was with the greatest difficulty we could prevent them from climbing up the sides of the vessel, and had not the precaution been taken of having the boarding-nettings up, the decks would have been swarmed. A few men and women only were permitted to come on board, and these really seemed pleased with the distinction shown them. An amicable feeling having been established, a brisk traffic soon commenced, the Natives holding up in their hands the articles they wished to dispose of, consisting of cocoanuts, yams, plantains, tortoise-shells, and their implements of war—viz., bows, arrows, and spears. In exchange they received small looking-glasses, empty bottles, beads, clasp-knives, axes, and old clothes; but iron was of all commodities most sought for, and appeared to be most prized: they were constantly calling for "tooree, tooree," (iron, iron) in the most eager and vociferous manner, and we could hardly appease their wants. I firmly believe had we remained at Murray's Island another day, the vessel would have been literally stripped of all that metal—not a bolt, nail, or hoop, would have been left. This bartering continued until nearly sunset, when the natives, by our request, quietly left, and pulled away to the shore, seemingly highly elated, not only with their bargains, but also with their visit. The canoes are hollowed out of a single tree, and are forty feet in length, two and a half in depth, and two feet wide in the centre,—gradually decreasing towards the bows and stern, which are sharp and slightly curved. They are pulled with short paddles, and are fitted with out-riggers, extending three feet over the side, on which is erected a platform of bamboo, where several people might sit: two masts can be stepped amidships, between which they hoisted a sort of lug-sail made of matting. The canoes were all adorned with feathers and shells, and the natives appeared to take much trouble in thus decorating them. It was a source of great fun to see these savages strutting about the decks with only only one garment on, as proudly and consequentially as possible. Their apparel was invariably put on the wrong way: some wore their trowsers as jackets, fore part behind; and the shirts were slipped over the legs, and tied round the waist. One individual was actually seen sitting on the deck, trying with all his might to force his huge legs through the arm-holes of a coat, until one of the crew relieved him from his difficult and laborious task, and placed it on the proper

way. The poor creatures seemed as much amused as ourselves, for they laughed and shouted immoderately: they were running to every one, requesting they might have the honor of exchanging names and rubbing noses,—a peculiar mode of proclaiming their friendship.

These islanders are certainly a fine muscular race of people, their average height being about five feet ten, and many were six feet and above. They were quite black, with woolly hair,—but had not the features of the African Negro, more resembling the Somali or Abysinnian race than any I remember to have seen. Their language was rather gutteral, but not unpleasantly so, and sounded like Arabic. Some few of the natives, however, had dark copper complexions, and approached nearer to the Malay: they were shorter in stature than the others; their hair was straight, and of a reddish hue: they were evidently of a different tribe; and I have no doubt were emigrants, either from New Guinea or some of the islands to the Northward and Westward. We had not sufficient opportunity of judging whether they spoke the same language or not, but concluded that they did. Their numbers, however, were few: the whole population of this island, I should imagine, does not consist of more than 300 or 400 men, women, and children. These savages were all in a primitive state of nature, their persons being destitute even of a fig-leaf, but they seemed to be perfectly unconscious of their nakedness. Their bodies were anointed with oil and soot, and their heads were decorated with tufts of grass and feathers: their hair was divided into innumerable small locks, each of which was matted together by fat or grease, and formed into lengths like corkscrews, so that their heads resembled a mop: others, similar to the Somalis, had lime rubbed over their hair, which gave them the appearance of a powdered wig: and nearly all had the cartilege of the nose pierced through, in which they wore, as an ornament, a small piece of polished bone, which our Jacks not inappropriately called the spritsail-yard. This was frequently removed, and a cigar or some other thing substituted. The body and arms of many were covered with welts cut into curious figures, by means of a sharp shell. The lower parts of the ears were also perforated, and reached in narrow strips to their shoulders: this I should imagine must have been done by suspending weights when young. Their beards were allowed to grow to great length, and they were thick and bushy—the Malay tribe before alluded to being the only exception, as they were almost destitute of that natural appendage to man. Although the appearance of these savages was daring and ferocious, yet they were not so in reality: anything might be done with them by showing a little attention and kindness: their

disposition was evidently good, and, had they been civilized, we should have derived great advantage from our intercourse. The women were small in stature, and in no respect so fair as the other sex: neither were they so well proportioned, their features being far less agreeable. They wore a kind of petticoat, made of dried grass twisted together, which was tied round the loins, and reached nearly to the knees: this had a ludicrous effect, and at a distance they resembled walking bundles of straw: the upper part of the body was left quite bare. Their hair was decorated the same as the men, but they had no lime: the body was not cicatrised, neither was the cartilege of the nose or ears bored. They were however very good humoured, and as fond of a joke as their lords and masters. Many of them came on board, and were quite at home with all hands: they were delighted with the presents they received, but more especially with the clothes, which they insisted on wearing: they seemed to be quite independent, and did just what they chose—the men apparently possessing very little influence or authority over them. Wishing to see a little more of the manners and customs of these interesting savages, the Purser and myself accompanied about twenty of them on shore in one of their large canoes; and they were quite pleased with this act, as it showed we placed every confidence in them, for we went entirely unarmed. No sooner had we stepped on board than they made us signs to sit down, which we did; and all began laughing and talking so fast that it was morally impossible to catch a word they uttered. We became very shortly great friends, and exchanged our names and rubbed noses again with all our sable companions,—not a very pleasing operation, for long before we reached the shore our faces were nearly as black as their own. One native, who sat near me, was so elated, that he took a large string of pearly-colored beads off his neck and presented them to me: in return, I gave him a gaudy-colored cotton handkerchief, which was much admired. On reaching the beach we were taken out *nolens volens*, carried through the surf by two huge savages, and safely landed near their village close to the beach: they then threw their arms around our necks in the most affectionate manner possible, and in this way conducted us to their huts (much to the amusement of all parties), where they seated us under the shade of some plantain and cocoanut trees, their women bringing us some fruit, which we partook of very heartily. A pipe, of a simple but curious construction, was then brought round, and each native, after inhaling the smoke once or twice, handed it over to us. We found the tobacco rather strong and pungent, and the flavor not at all agreeable: where they obtained it, it is impossible to say, but we

suppose it must either have been procured from ships passing, or it may have been cultivated by them. The pipe was made of hollow bamboo closed at one end, and was about two inches in diameter, and a foot and a half in length: at the other, there was an oblong aperture cut in the knot, apparently to fit the mouth: and near the part closed, a hole was bored, into which the bowl was inserted. This was constructed of some hard wood: it was three inches long, and one and a half wide at the top, gradually tapering away to the bottom. Whenever the pipe was required for use, the oblong hole was placed to the mouth, until by rapid suction the tube was filled: the bowl being then removed, the smoke was inhaled through that aperture. Two or three whiffs only were taken at a time, and passed round to the next individual. They were all very fond of smoking, and seemed to relish much our Manilla cheroots, which were constantly called for, but as constantly refused; and had we not made signs that all were done, our real stock would soon have been exhausted. They were certainly a merry set of savages, and seemed to enter with full spirit into whatever fun might be going on. So friendly had they become that nothing would do as a conclusion to our visit but a dance; so about a dozen of these naked savages stood up in a circle, and commenced by making a most singular clicking noise with their tongues, shouting at the same time in a terrific manner, and striking their spears together. They moved round at first slowly, but as they became excited, so in like manner their movements increased, till at last their bodies were thrown into such frightful contortions that they looked more like demons than human beings. They continued this extraordinary performance for nearly half an hour, when they ceased and squatted down, utterly exhausted by the exertion: it was a barbarous though ludicrous scene, and caused much laughter. I really know not what it was intended to represent, but should imagine, from their attitudes, it was a war dance. The women sat around and enjoyed the sport as much as the men: they were also very amicably disposed towards us, and were much pleased at any act of gallantry on our part,—their loving masters not being at all jealous of them, but rather to the contrary, for they frequently made unequivocal signs which plainly showed they wished us to be a little more intimate,—but a privilege of this kind we could only reject with horror and disgust. Their huts, which are enclosed by a paling of bamboos, are circular, something in the shape of a beehive, with a small door just large enough to allow a person to creep under: they are covered with the leaves of palm trees and grass, the interior being perfectly destitute of anything like furniture, except a few large bamboos or gourds,

which are used for carrying water. In the centre of their abodes, strung upon a pole, are the bare skulls and thigh bones of their deceased relatives, which they seem to hold in the greatest veneration. They have no religion of any kind, nor have they any idea whatever of a Supreme Being. We endeavored to intimate to them, by pointing to the sky, that there was the residence of the Deity; but it was of no avail—they could not understand our meaning: and all we received in reply was a shake of the head, and that peculiar click of the tongue before alluded to, and which was frequently had recourse to during our intercourse with them, and which was no doubt either meant as an expression of surprise, or tantaamount to the monosyllable no. We could attach no other meaning to this singular custom. They seemed to have no Chief, nor had they any laws to guide them. They were decidedly not cannibals, but infanticide, as we afterwards understood from the rescued boy Ireland, was practised amongst them: this horrible custom was only resorted to, however, when their families became too numerous to support. A sort of marriage ceremony is performed; and plurality of wives is permitted, but to what extent we were unable to discover.

They cultivate the ground, and grow principally yams and sweet potatoes; they also possess plantations of bananas, and extensive groves of cocoanut trees, so that the island produces ample food for the support of its inhabitants. These savages are mild and tractable, and if kindly treated would no doubt soon be civilized, and in time become useful members of society. A few discreet Missionaries might, I imagine, do infinite good amongst them, for they are also intelligent, and quite capable of being taught some useful occupation. It must, however, be acknowledged, they are expert thieves, but this propensity might easily be conquered by proper management, and a more extended intercourse.

The islands, laying in the direct influence of the S. E. trade, and many miles from the main-land, enjoy a very equable and temperate climate, the thermometer ranging whilst we were there from 74° to 78°. We walked about nearly the whole day in the sun, and found not the slightest inconvenience from so doing. It seemed to be very healthy, for there were apparently no serious cases of sickness amongst the natives. Scrofulous and cancerous diseases mere the most prevalent, and these might have arisen from the water, which is brackish: this evil, however, might be remedied, if wells deeper and further inland were dug; but these poor children of nature, having no means of excavating the hard

rock, are obliged to scrape a hole in the sand close by the seaside, from whence they obtain an indifferent supply.

The Murray Islands are three in number, one large and two smaller, the latter being merely rocks, but the former is situated in latitude 9° 54′ 10″ S., and longitude 144° 01′ 30″ E., and is about twelve or fifteen miles in circumference, 700 or 800 feet high, and can be seen of a clear day nine or ten leagues.

It is completely surrounded by a belt of coral reefs, extending some distance off shore, and rises rather abruptly from the sea, terminating in a peak towards the centre. From the appearance of the rocks and soil I should say it was of volcanic origin; but of this I am not quite certain, as our stay was too limited to observe with accuracy its geological structure. The soil appears very fertile, and the whole island is clothed with wood and verdure to the very summit. There are no quadrupeds whatever, except a few miserable lean pariah dogs; but the trees teem with innumerable birds, such as doves, pigeons, and paroquettes. One of the former was shot, whose plumage was of a most delicate cream colour, with a tinge of pink, and it was certainly one of the most beautiful birds of the kind I ever saw. Fish are plentiful, and are usually captured with a long three-pronged spear made of hard wood. Turtle also abound amongst the reefs—the natives destroying immense numbers for the sake of the shell, which they form into rude ornaments, and dispose of, whenever they have an opportunity, for old iron or axes, or other trifling articles. A trade of some value might be carried on in this single item alone, and I am only astonished vessels do not visit this spot oftener for the sake of this traffic. I feel convinced that, if the natives only knew of its importance, large quantities might soon be collected and kept in store, and it would not, moreover, be—as it now is—depreciated by the wretched carvings which almost destroy the beauty of the shell: the quality is excellent, the plates being large, thick, and spendidly marked, and, in its natural state, would no doubt realize a high price.

After we had remained on shore a considerable time, we took leave of our sable friends, and proceeded on board, followed to the boat by nearly all the inhabitants, men, women, and children, who really seemed to part with us with regret, for immediately we pushed off from the beach, many of them rushed into the water and would hold on by the gunwale, and it was with the utmost difficulty we at last got away from them. A savage called Mahdoo, a man about forty years of age, one of the most

intelligent of his race, honored us with his company on board. He made himself quite agreeable, and explained, by signs, the meaning of many words in his language. If we did not at once pronounce them correctly, he would make us repeat the word over and over again, until at last the right accent was caught. If more than one put a question, he would make signs for the last person to wait until he had replied to the first, and then would turn and give the required answer. He visited the gun-room, naked as he was, whilst we were taking our supper, and seated himself down by our desire at the table, partaking very heartily of a cold round of beef, biscuits, and some coffee, all of which he appeared to relish; but wine or spirits of any sort he expressed the utmost abhorrence of: we gave him some to taste, but he made such a dreadful sputter about it, that we refrained from trying him again. He watched us eating very narrowly, and then followed our example in everything we did. The knife and fork were used as if he really had been accustomed to them, and it was astonishing to see how well he conducted himself whilst on board. His manners were gentle and pleasing, and he was altogether a fine specimen of this savage race; being tall, well proportioned and muscular, and though not strikingly handsome, yet the expression of his countenance was decidedly good. We showed him a small musical box, and set it going, and his amazement at hearing the sounds this produced was very amusing: we could not keep him seated on his chair, but with eyes and mouth open he danced about the cabin in the most frantic manner, fancying it must be something living: he looked under the table, lifted the chairs, and peeped into all the cabins, as if determined to find out where the animal was secreted, and he was not satisfied until we showed him the mechanism of the box: but this was as puzzling to him as ever—he could not make it out at all; and at last, flipping his fingers and shaking his head, gave it up in despair. The tones of this little instrument so enchanted this wild creature, that he eagerly sought it as a present for his piccaninnies; but we were obliged to refuse this modest request, as we knew in such hands it would speedily be demolished. He was also delighted with a picture we shewed him of a group of female figures, which he pressed to his breast, and bestowed on them sundry warm though not very tender kisses. The expression of savage joy, as he sat gazing with astonishment on the painting, was truly absurd: he breathed quickly, his large eyes rolled in his head, his body was erect, and he grasped the frame of the picture so tight that we thought he would have destroyed the only three beauties in the ship: however, as fortune would have it, our young ladies came off scathless, though we had some

difficulty to obtain possession of them. The last scene which took place caused great amusement. The Doctor, by signs, having made Mahdoo understand that he was going to boil water on the table without the aid of fire, produced two tumblers which had been already prepared, one containing acid, and the other carbonate of soda. The water in each was then felt by Mahdoo, to convince him it was perfectly cold. As soon as this ceremony had been gone through, the mixture was thrown together, and immediately it began to bubble and phiz: the poor creature became so terrified at this wonderful feat, that he gave one terrific yell, and, amidst roars of laughter from us, rushed with precipitation up the ladder, upsetting the chairs, and capsizing the unfortunate cause of the mischief in his flight; and all our persuasions could not again induce him to venture below: thinking us no doubt a set of mischievous fellows, he was therefore unwilling to trust himself in our society, for fear we might play him some other trick; but shortly after, he contentedly laid himself down on the deck, and was soon in a happy state of oblivion.

During the morning one of the savages in a canoe alongside held up a letter, which he gave to the Captain for a knife or an axe. On perusal it proved to have been written by Captain Lewis, Commanding His Majesty's Colonial Schooner *Isabella*, which left Sydney shortly before us on the same mission as ourselves. It stated that they had succeeded in rescuing from the Murray islanders two only who were on board the *Charles Eaton*, by name John Ireland and Charles D'Oyly, the former a lad of about sixteen, an apprentice to the ship, and the latter a child of about three years old, a son of Captain D'Oyly, of the Bengal Artillery, who, together with his wife, were passengers from Sydney to Calcutta. These unfortunate boys were quite naked when found by Captain Lewis, and young D'Oyly had become, in manner and appearance, a perfect little savage, being quite brown and freckled, and his body covered with a thick whitish down. He was however a fine stout healthy-looking child, and apparently had not suffered by his residence with these savages: his countenance was rather broad, but pleasing, and he was tall for his age. His hair, which had never felt a comb, was flaxen, and was long and shaggy, and his eyes were blue: these were characteristics plainly showing his Anglo-Saxon origin. Ireland was tall and thin, complexion and hair dark, and much sunburnt. They both spoke the native language fluently,—so much so, that the latter had almost forgotten his own tongue. He could hardly, when first discovered, put a sentence together, and seemed quite at a loss for words; but he soon get over this defect, and in a week or so

after being on board of the *Isabella*, he spoke as well as any one in the vessel.

The natives, by signs, informed Captain Lewis that the crew of the *Charles Eaton* were murdered and eaten by the inhabitants of an island situated about sixty miles to the northward, called by them Boydan, with whom they were at war about the time of this disastrous wreck; and knowing or hearing that two white people were in the hands of these cannibals, the kind-hearted Murray islanders, by some stratagem or manœuvre, managed to rescue these two lads from such a miserable existence, and brought them in safety to their happy isle, where they treated them with the greatest hospitality. Young D'Oyly was given over to the care of the women, who were quite proud of their charge, and showed him the utmost affection. Ireland was offered a wife, and a plot of ground, if he would only remain amongst them, but he refused, hoping that a time would come when he might escape, and be able once again to visit his native land. When taken off by the *Isabella*, the poor boys had been nearly two years in captivity, and they both really seemed to part with their friends with much regret. The savages were also distressed at their protegés leaving them never to return. It was with the greatest difficulty, and not before many presents were given, that they were at last persuaded to part with them. The women who brought the child off, when he was taken from them made the most dreadful lamentations, beating their breasts, and howling and weeping most piteously. Captain Lewis informed us afterwards, when we fell in with him, that the scene was altogether a most affecting one: we could hardly have believed that savages could ever have shown so much fondness for children; and this noble trait speaks volumes in their favor, and makes their character doubly more interesting to the Christian world. Poor young D'Oyly, when given over to strangers, cried most bitterly, and wanted much to return to his old protectors: his grief at parting with those who had been so kind to him, lasted for several days, and none but Ireland could pacify him. He shunned the faces of all on board, and endeavoured to hide away in some dark corner of the vessel, quite dreading the approach of any one. At night his fears were beyond credence: he would not allow his companion in misfortune to be out of sight for one instant. I do not think the grief of this poor young child could be wondered at, considering that he never experienced the fostering care of a mother's hand, or could have known a mother's love, having been taken from his hapless parents when only a few months old, so that he could

possibly have no idea of any other person having shewn him so much affection as these poor benighted, but warm-hearted, savages, whom he had for ever deserted.

Perhaps it may not be irrelevant, or out of place, were I to give a concise account of the wreck of the *Charles Eaton*, and ultimate fate of the crew and passengers, as related to us by John Ireland shortly after we met with the Schooner *Isabella*. It was altogether a confused statement, but it was of thrilling interest, and though he had forgotten dates and localities, yet the massacre was borne in his memory with frightful reality: every circumstance of that dreadful event was indelibly impressed on his mind, and for a long period after he said it haunted him by night as well as day, and even in his dreams he could hear the cry of distress and groans of his unfortunate comrades. During the days he remained with these terrible cannibals, and until he was luckily rescued by the Murray Islanders, his life was a complete burden to him: he was treated with much severity, as a slave, and if he did not perform the labors alloted to him, the savages used to throw at him spears, several of which pierced the fleshy parts of his body, the scars being at that time visible. He could not in any way account for the fact of his life (the only one, besides little D'Oyly, out of forty) having been spared. All that he remembered was, that when the dreadful act was perpetrated, he ran into the sea for the purpose of drowning himself, but his heart failed him, and he remained up to his neck in water, until the morning, when he was discovered; and he supposes that the savages, having been surfeited with their deeds of blood the previous night, thought perhaps it would be wiser to make him their slave: young D'Oyly, he believed, was taken away from his mother by one of their women. The *Charles Eaton*, he told us, was lost on one of the reefs forming the Great Barriers, but he knew not the exact position, nor the particulars of that calamity: all that he remembered was, the boats were stove in by the sea, and that recourse was had to a raft, which was constructed of all the spars they could find. On this they all embarked, taking with them some provisions and water, also some arms. A square sail was hoisted in the centre, and they drifted before the wind for some days, not knowing where they were, until at last they made the ill-fated isle of Boydan, about the middle of the day. As they approached the shore, a canoe, with a few natives on board, was fallen in with, who seemed most friendly disposed, and made signs for them to land, which they did, and soon after the natives brought them water to drink. Few being about, and so much confidence having been

placed in their apparent amicable disposition, no treachery was feared: the whole party thought themselves safe in such hands, and, being much exhausted by exposure, and the privations they had endured for some days past, laid on the sandy beach, and were soon sound asleep, no watch being deemed necessary. But in the mean time the savages had all disappeared, and not a sound of them was heard to disturb the slumbers of the poor worn-out shipwrecked crew, until night had closed in, when the wily, cunning savages, who had not been idle, by this time had collected their numbers, and by stealth crept near their sleeping victims—so near in fact, that escape was impossible, watching a favorable opportunity: they then uttered a dreadful yell, rushed in upon the whole party, and with heavy clubs murdered them as they lay on the sandy beach. One shriek of horror and despair fell from the lips of our poor countrymen, but all was soon hushed in the deep silence of death: the deed of blood was completed, and in a few minutes more the murdered remains were dragged some distance off, a huge fire was kindled, the feet, hands, and heads, were then severed from the bodies, and the parts above named were roasted and eaten by these wretched cannibals, who, whilst this horrible feast was preparing, danced round the mutilated corpses in savage exultation, howling and yelling in the most dreadful manner.

The frightful scene lasted for some hours, and was clearly seen by Ireland, who the whole time was in a state of extreme mental agitation, scarcely knowing what to do: even as he detailed to us the enaction of this awful tragedy, a shudder of terror passed over his frame. After this inhuman banquet was over, he saw the bodies of the murdered cast by these wretches with ignominy into the sea.

The skulls of the victims of this brutal and inhuman massacre were carefully preserved by these monsters, as a trophy of their bravery; for Captain Lewis, when he laid waste the island, discovered in the centre, near the shade of some trees, a rude shed erected, under which they had been placed, built up in the form of a pyramid. This Golgotha was enclosed by a paling, and was evidently *tabooed*, for a frightful wooden figure, in the human form, painted with red ochre, and with eyes made from the oystershell, and their pupils stained black, rested at the base of this horrible sanctuary, and was evidently a representation of their Deity, or rather the Demon whom they worship, and whom they might have sought to propitiate, by the sacrifice of so many human lives, perhaps for some misfortune that might have befallen them, or perhaps for some

defeat experienced in their wars with other tribes. This I think might in a measure account for such wholesale destruction of human lives, as I cannot bring myself to believe that any set of men, however savage, could commit such cold-blooded massacre without some superstition to urge them on. The skulls were about forty in number, and were carefully examined by our Surgeon, Mr. Hughes, who pronounced the greater part to be those of Europeans. They all bore the marks of extreme violence, many being dreadfully fractured, as if by the repeated blows of some heavy blunt instrument, such as a club; and one we particularly observed, had light brown or flaxen hair still adhering to the bones, and was apparently that of a European female. The *Isabella* conveyed them to Sydney, and, as I subsequently learnt, had them all interred in consecrated ground; and a handsome monument, I believe, bearing a suitable inscription, is now erected over them.

The relation of this horrible massacre shows how necessary it is, in all intercourse with savages, to be guarded and circumspect in our actions and behaviour towards them. They are naturally wily, cunning, and treacherous, and therefore on no account ought to be trusted: had the crew of the *Charles Eaton* paid no attention to such a profession of friendship as the natives exhibited in this instance, or had they taken the precaution of keeping a watch, perhaps this deadful tragedy would never have been enacted: they could well have defended themselves, for they had arms and cutlasses; and a few rounds of musketry on the first onset would, in all probability, have sent these miserable savages flying like cowards from the field of intended slaughter, and I have no doubt the whole of them would speedily have abandoned the isle.

Captain Lewis and the crew of the *Isabella*, when they found the skulls of their poor Christian brethren piled up, could scarcely contain their anger: summary punishment was at once sworn to be inflicted upon these cannibals, should they fall in with them, but, although a strict search was made, none were to be seen—the place had evidently been recently deserted on the first sight of the vessel, as fires were still burning near some sheds. However, they wreaked their vengeance by cutting down the trees, burning the huts, and destroying everything that would prove useful, so that the whole spot was rendered waste. This I think was rather an injudicious step, as it might make these savages more desperate and merciless should Europeans unfortunately ever again fall into their hands.

The anchorage of Murray's Island is on the north or leeward side,

where a vessel may ride with perfect safety, sheltered by the trade winds and protected from any swell by the numerous reefs surrounding it. The *Tigris* anchored half a mile from the shore, in twenty-five fathoms, coral sand, with the extremes of the island bearing from South to North 73° E., Darnley's Island N. 51° W., but this position was by no means a good one, as we were within a hundred yards of a shoal dry at low water. The best berth is about three quarters of a mile further to the westward, in a small bay formed by coral reefs, projecting some distance from each extreme of the land, and about half a mile or so from a fine sandy beach of dazzling whiteness, composed of pulverized coral. The south-east trade at times blows strong here, and heavy gusts sweep over the land; precaution is therefore necessary to prevent the vessel driving from her anchors, but with good ground tackling, and a moderate scope of cable, nothing need be apprehended. The tide through these channels runs with great velocity, the flood setting in from the eastward, and the rise and fall is considerable, so that rocks and shoals, as that able and truthful navigator, Captain Cooke, says, which are several feet under water one hour, may be perfectly dry the next. During our passage through Torres Straits we had frequent opportunities of testing the veracity of the above remark, and of observing the extraordinary effect of this rapid change: numerous patches seemed suddenly to emerge from the sea, as if by the touch of a magician's wand, exposing their crested branches to the gaze, exhibiting a variety of beautiful tints, and forming in appearance a rich pattern raised upon a groundwork of the brightest blue. On these detached clusters might be seen coral in all stages of formation, from the soft glutinous secretions of the infusorial animalcules, to the hardest stone. It is astonishing to contemplate the gigantic structures which are here erected by those small insects, whose dimensions, we are told, are so minute that it is scarcely possible to form an adequate idea of the conditions of their existence, more that ten millions being required to fill the space of a *cubic inch*: and yet their labours have caused islands as well as continents to spring up from the depths of the mighty ocean, converting the wide waste of waters, by process of time, into a fit habitation for the abode of man! Not only do we witness the work of progression still going on, but ages before this planet was peopled were the same tiny creatures in being; and modern geologists have informed us, that they occupy a really important place in the great plan of creation, —their recent discoveries also fully proving that nearly the whole of the tertiary or silurian formations are principally composed of

the shells and remains of this numerous class of zoophytes; and so abundantly and so universally are they distributed throughout the surface of the globe, that the mind of man is lost in wonder and amazement, for it is far beyond the power of his imagination to conceive the countless ages that must have passed away, and the incalculable numbers of these insects that must have been required, ere such vast deposits could have been formed. Even in this part of the world, the sea for hundreds of miles is studded with innumerable coral rocks, shoals, and islands, running in an almost unbroken and continuous ridge, from the Tropic of Capricorn to the Latitude of 9° S., and extending as far to the Eastward as the Archipelago of Lonisade: in fact the greater part of the Pacific Ocean abounds with countless chains of beautiful coral islets, rising like gems from the sea, covered with trees and verdure, and containing a numerous population.

The coraline formations of Torres Straits, as far as we could observe, have decidedly the same character and peculiarity as that which bounds the Red Sea. Here we have an extensive line of reefs, stretching far out at sea, running parallel to the coast, the outer edges rising precipitously from depths unknown, only broken here and there by narrow gaps and openings; also an inner or shallow coast channel of considerable width: and within this enclosed space are scattered detached shoals and islands, but of safe navigation, containing many good anchorages, and free from the turbulent swells of the ocean outside. Beyond this clear space is another body of reefs fringing the line of coast, and running but a short distance off. The outer, or seaward passage, like the centre channel of the Red Sea, is wider, and also fathomless, rendering anchorage an impossibility. No refuge whatever could, therefore, be had in stormy weather outside this barrier: the only chance of shelter would be, to run for some opening in the reefs, and anchor within.

The natives navigating the Red Sea invariably make use of the inner route, as they have perfectly smooth water, with land and sea breezes; and they also take every possible advantage of the tides, which materially aid them in their progress. At night they come to an anchor under the lee of some bank, and wait until the tide serves the following morning: thus, whilst vessels outside have been contending against heavy gales, or have been becalmed, the boats inside have neither felt the fury of the storm, nor lost the wind, but have been quietly and smoothly speeding along with a gentle breeze towards their destined port. The same advan-

tage, I presume, might be taken of the inner passage of the Great Barriers: with a steamer there would be no difficulty experienced.

Early the following morning, the 29th of July, we were again visited by our sable friends, but none of them came on board, though a little bartering was carried on alongside by some of the idlers, whilst the crew were busily engaged making sail and preparing for a start. At 7h. 30m. A. M. the anchor was weighed, and as the vessel cast with her head to the Northward, the sails caught the full force of the breeze, and set her bounding like a fawn over the bright waters of this coral sea. No sooner were we fairly off than Mahdoo, who had been watching intently all our operations, suddenly waved his hand as if in adieu, and before we were aware of his intentions, sprang from the poop taffrail into the sea, and swam to the nearest canoe;—the natives at the same time shouting and vociferating loudly, and we could see them for a long time after, still dancing and waving palm branches, evidently showing by these signs that they regretted the departure of the *Tigris*. Thus ended our visit to this hospitable and friendly Isle, and though it may be the last, yet I should rejoice if fortune ever again leads me amongst this simple-minded and kind-hearted people.

Steering to the N. Ed. under all plain sail, with cloudy weather, and fresh trade S. E. blowing, passed over about a mile and a half off the shore, a strong ripple with soundings of eight and a half fathoms, hard bottom. At 7.50, when the peak on Murray's Island bore S. $\frac{3}{4}$ W. $3\frac{1}{2}$ miles, kept away N. W. by West; least water twenty-five fathoms. At 8 A. M. the island bore S. E. by E., distant about five miles. Here discovering that we had missed Cumberland's Passage, in consequence of the erroneousness of the charts, hauled to the wind and stood to the S. W., retracing our steps with the hope of getting once more into the fair channel: but after several fruitless attempts, found ourselves at last in a worse position than before, being now in a complete labyrinth of reefs,—working to windward of some, and bearing away to leeward of others; at times sailing over several detached rocks with three or four fathoms on them, and so clear was the sea that they seemed literally within a foot of the surface. I fancied several times the vessel must strike on them, and that nothing but a miracle could save her; but fortunately the eye was deceived, and all were passed in safety. We were obliged, however, to keep a boat ahead the whole time, to sound and to warn us of any sunken rocks that might be in the way,—Captain Igglerden being himself at the masthead,

carrying the vessel through this intricate and dangerous channel. At noon, Murray's Island bore N. E. distant eight or nine miles; no bottom at thirty fathoms; soundings very irregular, and many overfalls,—still threading our tortuous way midst a forest of coral shoals, steering to the southward and westward, and altering courses as required. At half-past three a clear space was at last discovered bearing W. by N., for which we made, but finding this was not the proper channel, and as we were still too much to the Southward, and the glare of the sun making it difficult to distinguish the reefs, bore up and anchored for the night under the lee of an extensive coral bank in twenty-five fathoms, very foul ground about a cable's length from its edge. The channel here is a quarter of a mile wide, but it is a most intricate and dangerous one, and on no account ought to be attempted. Fortunately the *Tigris* was well manned, and moreover worked easily, otherwise our position would have been critical in the extreme, for we were necessitated to carry all possible sail in order to stem the eddy currents, frequently tacking with our flying jib-boom quite over the shoals, so that had the vessel missed stays and struck under such a heavy press of canvas, she must have gone to pieces—no earthly power could have saved her. The bearings of Murray's Island at this anchorage was N. 43° E., distant about six leagues. The weather during the night continued cloudy; the wind blowing strong from the S. E., with heavy gusts at intervals; the sea remaining perfectly smooth,—the anchorage being well sheltered by the numerous surrounding reefs. We experienced here such strong eddy currents that a heavy harbour lead that we had overboard would not remain on the bottom, being evidently carried off by the velocity of an underset. During the middle watch the vessel began to drive, and shoaled her water from twenty-five to eight fathoms. Another anchor being immediately let go, she then held on after drifting back to eighteen fathoms. At daylight the next day, observed a shoal a short distance from us, with the sea breaking over it: sent the gig to sound, and she soon after returned, when the officer in charge, Mr. Leeds, reported there were only three feet water on it, but close to the edge seventeen fathoms. At sunrise commenced weighing, but after many futile efforts to heave up the larboard bower, obliged at last to desist, as we found the cable had got a turn round the cauliflower head of some huge coral rocks. We consequently slipped, and thereby lost the anchor and about sixty fathoms of chain. The starboard bower was however weighed with some difficulty: we then made sail with a find fresh trade, and stood to the south-west, steering between innumerable reefs

and sunken rocks, guided entirely by the eye, the Captain and Mr. Draper still piloting us from their lofty position at the top-gallant-masthead. To-day we again passed over several dangers a few fathoms under water, and were again entangled,—not a clear spot visible as far as the eye could reach,—every moment meeting with greater obstacles and difficulties, and every moment our position was rendered more perilous than ever. So thoroughly was the brig ensnared amongst the maze of coral shoals, that we all began to despair of ever getting out of them: it was certainly a most puzzling affair, though anything but agreeable to us. At noon, Murray's Island bore N. 43° E., distant about eight leagues. Kept away W. N. West and stood on this course three miles, skirting the southern reefs of Hibernia's Passage, which is about three miles wide; but many sunken rocks were discernible in various parts. At 1, Murray's Island could no longer be perceivable, and by this time there seemed to be some prospect of our being able to extricate ourselves from this labyrinth of dangers ere the sun had set, for the channel now became fairer and more open, the soundings more regular, and the rocks and shoals fewer in number and wider apart. As we progressed, Halfway Island hove in sight, and the white foamy ridge of breakers, which were previously seen dancing and gleaming in the sunshine, also became fainter and fainter, until at last they faded away altogether from our view.

Halfway Island is a low uninhabited coraline formation, elevated only a few feet above the surface of the water, and cannot be seen further off than two or three leagues, though not more than a mile or so in circumference. It is covered, however, with a dense jungle of shrubs, intermixed with a coarse kind of grass and trees, chiefly of the Pandanus palm, the fruit of which serves as food for the natives. The soil is composed of decomposed vegetable matter, and could be brought to a high state of fertility. There are no springs or wells, and it appears quite destitute of water, though I have no doubt this might be procured by digging. The island is surrounded by a belt of coral rocks, extending a short distance off the shore, and at the eastern end there is a dry sandbank, which runs out three or four miles, and affords excellent shelter from the S. E. trade. It is situated in latitude 10° 18′ S. and longitude 143° 18′ E., and bears from Murray's Island S. 61° W., distant fifty miles. We found the ebb-tide here setting to the N. Westward at the rate of three miles per hour, but it was not quite steady, and seemed to be subjected to eddies, still owing perhaps to the vicinity of the reefs and shoals. At 3 P. M. anchored off the island in seventeen fathoms, coral sand, half a mile from the shore, the

centre bearing S. 34° E. At 4, a party of officers visited the shore, and during their rambles discovered, carved on a tree in conspicuous characters, the words " dig under," which they immediately did, and found a bottle containing a letter from Captain Lewis, of the *Isabella*, dated the 28th July 1836, detailing the results of his proceedings to the northward,—an account of which I have before alluded to.

ART. X.—*Journal by Lieutenant* W. CHRISTOPHER, *of the Indian Navy, of his Ascent of the River Chenab.—Dated Vizerabad, 1st October,* 1847.

[Presented by Government.]

No. 29 OF 1848.

From Lieutenant CHRISTOPHER, I. N., *1st Assistant Indus Flotilla, on special duty in the Meanee steamer, to Commander* F. T. POWELL, I. N., *Commanding Indus Flotilla, Kotree.—Dated Vizerabad, October 1st,* 1847.

SIR,—In pursuance of the requisition from the Resident at Lahore,—a copy of which I forwarded,—the *Meanee*, steam-tender, quitted Buckree wood-station, situated at the point of the confluence of the Chenab and Sutlej rivers, on the 8th ultimo, to ascend the Ravee to Lahore. I had been assured that wood was prepared by the chiefs of villages for this experiment, but it seemed prudent to take in two days' fuel, or 400 maunds. The channel of the Chenab was found intricate and shallow for the first ten miles, the river flowing down in several passages; but a little above, the water kept in one channel for many miles, the average depth being ten feet, and current three miles an hour. The steamer made good progress, the river not winding so much as the Sutlej. Found some excellent fuel ready at twelve miles (stacked on right bank,) at Sultanpar. Proceeded on, and at dark secured at Tibbah village on right bank, having made thirty-three miles from 8 A. M. General direction of river N. by E. Throughout this day, the cultivation on both banks has been most luxuriant, and population dense for the east. Sugar-cane seems much cultivated between the Chenab and Indus. Indigo, tobacco, and grain, are in the ground. The waters of the Chenab in this, its lower course, are red in colour, and its bed is generally clay, though sandy places are occasionally met with. Where the bed of a river is formed of

clay, there is a probability of its remaining more permanent and steady in its course. Under this view, it seemed to me worth the trouble to make a rough draft of this river's channel, which I shall prepare for transmission on returning down from the highest point reached: being without chronometers, &c., astronomical points of correction, if thought advisable, can afterwards be determined. I shall note all principal towns, and the course of the river between them; their several distances being estimated from the vessel's progress, and checked by the accounts of intelligent natives,—the compass always taken on shore for the principal connecting bearings, to avoid local attraction in the steamer.

The natives of all classes and sexes, young and old, follow the vessel for miles along the bank: seldom one posse of villagers are out of view before others are seen hurrying down. From the abundance of cultivation, no jungle for fuel is seen from the river.

Sept. 9th.—The steamer has come on to-day without any stoppage, except for fuel, which was ready prepared and good. The channel of the river was particularly favorable; the current, however, somewhat stronger than the Sutlej, being three miles an hour at this season. Arrived at Mooltan bunder at 5.30 P. M., having made thirty-five miles during the day over the current.

Sept. 10th.—The Naib of Mooltan having proposed to visit the vessel on her return voyage, quitted the ferry at noon, and proceeded up. The natives are very suspicious of our intentions: the Naib, or Dewan Moolraj, repeatedly asked me if more steamers were not coming. I could only reply that to the best of my knowledge and belief others were not coming at the present; but this appeared to dwell on his mind, and in a short interview he three several times referred to the subject. Finding that another officer, a Lieutenant Anderson, travelling up this way, had been presented with 125 rupees in common with myself, as an honorary gift, we agreed to write in the same spirit, a letter, stating that, as British Officers, we could not accept any gift of the kind, but merely paid the Dewan the compliment of a visit, and requested he would allow us to return the money. We sent separate letters in English, with translations in Persian, having our names affixed, but the great man would not so lower himself in the eyes of his retainers, and court, as to accept the returned cash, but insisted, for his own honor, that we would receive it. On this, presents were given from it to his servants, and the balance will be paid, in the way I may be ordered, to the credit of Government. In

the meantime it is useful for ship's purposes. She made good progress during the afternoon. The strip of cultivated land on the right bank, opposite to Mooltan, is very narrow,—three to five miles broad,—only the mounds and waves of desert sand, topped by stunted bushes, being visible in many places, but, wherever water is raised and distributed, the soil is abundantly fertile. The fuel of Kandah wood continues excellent: in Mooltan, a camel load of five maunds costs two to three annas, but this is not split and shaped for furnaces. To-day, during four hours and twenty minutes gained fourteen miles over the current. Several clay banks in channel of river this day.

Sept. 11*th.*—*Navigation of the Ravee river dangerous.*—Left early, and at 4.30 P. M., after running twenty-four miles over the current in nine hours, entered the Ravee river and steamed up about a mile and a half, the channel very winding, having banks of clay from three to nine feet high—the color of the water red. Though the passage down the Sutlej had not occupied half the time of former ones (see comparative statement marked A.) yet the water in the Ravee was too low to hope for a successful run up, or to indulge any expectation of being able to pass down, and out of the river again, even if we persevered and succeeded in getting up opposite Lahore. The letter from the Resident specially mentioned that, from all accounts, he feared the season was too far advanced for ascending the Ravee, in which case he begged that I would attempt the ascent of the Chenab river. After steaming with considerable risk up the Ravee for the short distance effected, the obstruction to further progress was a steep bank of clay rising in the centre of the river's channel. While steaming in ten feet water, to pass this on the port hand, a cross current carried the vessel towards it against the helm: the engines were eased and stopt, but the port wheel took the continuation of the bank under water, and the shock was like striking a rock. The vessel washed clear, and an anchor was let go. On examining the wheel, several arms were found broken. Men were sent out to look for a channel, and the greatest depth, a little above, was found to be two feet: under these circumstances it was but common prudence, at this late period, to give up the attempt, and proceed at once up the Chenab, as suggested. It is barely possible that with two or three days' labour, and on lightening the vessel, we might pass up the Ravee; but it is not at all probable that we could come down again before the rise of the river in April next year, supposing that we were now to persevere and ascend the Ravee all the way to Lahore. Under these circumstances, the vessel is taken back to the main stream of the Chenab, and secured for the

night near the large town of Sirdapoor. Lieutenant Anderson proceeded overland to Lahore direct.

Sept. 12*th.*—The repairs of the port wheel occupied the engineers till noon. At 12.20 cast off, and proceeded easily over the current at 3½ miles per hour. On passing the junction of the Ravee river, the waters of the Chenab proved of a yellowish white color, very similar to the Sutlej; and the banks thrown up by the river current were no longer characterised by an overlying stratum of clay, but were composed of granitic sand. Made eleven miles by water in 4h. 15m. steaming, having grounded for one hour and forty-five minutes.

Sept. 13*th.*—Lost time to-day from not knowing the channel, there being several. Made thirty-five miles in 12h. 30m. steaming. Date groves occasionally seen: the tree seems productive, and of a large size. Reached Kassedpoor at 7 P. M.

Sept 14*th.*—Being in want of fuel, were detained till 9.40 A. M. At 10.35 reached the ferry called "Trimee" by the natives, the name having reference to the principal feature of the neighbourhood, namely, the confluence of the Jelum and Chenab rivers in the immediate vicinity. There are several large towns, namely, Jhang, &c. Remarks on the Jelum were omitted, as more accurate data were obtained on our return. The banks of the Indus are represented by natives of rank to be fifty-three nautical miles distant: they said there were eight to ten miles of cultivation, and then water was obtained only from deep wells; and the intermediate space between the cultivation of the Indus and Chenab—about thirty miles—was occupied by shepherds, rearing camels, kine, buffaloes, sheep, goats, &c., with a small field or garden of esculents near their wells occasionally. The visits of tigers are much dreaded, and sad accidents, and many losses of cattle, are detailed, from the sudden and irresistible spring of this powerful animal: one old man enumerated fifty such accidents that had occurred in his own recollection. The piece of land washed by the rivers Chenab and Jelum just previous to their junction, seems, from some cause, not to have been cultivated lately—it is said by the poor people from the oppressive conduct of the Jhang Sirdars; and in consequence, high rank grass has sprung up, and here tigers find a shelter. A native of some consideration was on board the steamer, when his servant, whom he had sent to the village a mile and a half distant for his mare, came running, out of breath and in evident alarm, saying that a tiger had come out upon him, and the

mare had broken loose—he running away. The people, without firearms, went in a body to assist the man to recover his animal, and she was found, not far off, uninjured. Hence arose further enquiries about the devastations of tigers: they say there are five in this immediate neighbourhood. This could hardly have been expected to be met with on the banks of fertile rivers in the very heart of the Punjaub.

The vessel reached Jhang in five hours' steaming up the Chenab river, after the junction from the northward of the Jelum: the distance is fourteen miles by water, and ten miles by land.

Sept. 15th.—Being unwell from an attack of jaundice, and my eyes being very weak, did not proceed until the 17th. I felt more at ease, having entered and tested the channel of the Chenab (strictly speaking), as all experience shows that every river winding through an alluvial plain, and fed solely by torrents from the hills, improve as you ascend, in general depth and body of water, until the junction of the feeder first met with, unless obstructed by rocks in its course.

While at the bunder of Jhang, the authorities pressed me to accept 250 rupees, three horses, and other presents, but I was successful here, as in every place (except, as mentioned, at Mooltan,) in persuading the people to keep their presents. I must have had some 1000 rupees offered me in this way at various times. It seems a very ancient respectful custom, to come into the presence of one regarded as a superior with some offering. The present here is placed generally on a white cloth, and tendered in a stooping posture: the attitude of attention is the same that prevails in lower India,—namely, the hands are pressed palm and palm, and held in front of the chest.

"Jhangsealeh" is the capital of this district: the Sealeh tribes were lately the lords of the land.

Sept. 17th.—Quitted Jhang, having the principal Natives on board as passengers for a few miles. The Deputy-Governor is a hearty good-natured man, who has travelled much in India. He assures me I shall find abundance of fuel, and other supplies, ready all the way up. The authorities speak nothing but Punjabi generally, but this man knows Hindoostani and Persian. It was novel to see grey-bearded men shewing all the delight and excitement of children examining new toys, as the various wonders of the steamer were pointed out by the moonshee: I found out afterwards, they were very anxious for the guns to be fired, but their politeness prevented them asking for the display.

During nine hours fifty minutes' steaming made twenty-six miles by the river, and 18½ miles direct distance. Secured for the night at the large village of Mahomed Shah. During to-day, a range of hills was seen to the westward, fifteen to twenty miles from the river, not noted on any map. The highest hill of the range is a great help in the construction of my sketch of the river, for it is very difficult, from the level nature of the country,—the river banks being from two to eight feet high only: to see any moderate distance, I am obliged to ascend trees, &c.

The fuel of a Mimosa, called Kandah or Jand—it has two names,—is particularly good: the average consumption by weight per hour is less than on the Indus. The price of wood in this town is nineteen maunds for a rupee.

Sept. 18*th.*—After proceeding a short distance came in sight of another range of hills, both unnoticed in any map, which the natives assure me extend across the river's bed, the water passing in two channels between them. They were first seen at a distance of about eighteen miles, by native account, which will give a height of 400 feet. I may here mention, that on repeated enquiry of natives of intelligence, the *Kutcha Koss* is 1360 kadum or double paces (the measure is styled the *kad of a man*), which might be in English rendered "*the stride of a man.*" Allowing the double pace to be sixty-four inches, a coss will be 2390 yards, a little more than a geographical mile and a third (2347 yards). They have another coss of 1600 kadum sometimes quoted hereabouts, and called the "Nanakshai" coss, which, on the same estimate of the length of a "kad," will give 2844 yards to the coss: this is not in common use. These are the only two measures of distance I can hear of—they are adopted from the Arabs. The aspect of the hills in sight is barren in the extreme; the range through which the river passes extends five or six miles E.S.E. and W.N.W. The other range, seen yesterday, extends N. and S. for seven miles, and is from five to 800 feet in elevation: they are isolated rocks, standing in an immense plain. Though the cultivation is most luxuriant immediately along the banks, yet we do not see as many canals on a superior scale as are witnessed in Sinde.

Made during the day thirty-six miles in 11½ hours' steaming, and secured just below the range of hills through which the river passes. Chunyat, a large town on the left bank, is two miles distant. Fuel is abundant and good; a forest of kandah, peelee, and kurrel, trees, extends, by native

account, from this to Lahore; it is six miles distant from Chunyat town, where firewood sells at twenty maunds the rupee.

Sept. 19*th.*—Proceeded through the western channel of the hills, least water six feet: the natives assure me the river is never fordable here in the lowest season. The neighbourhood of Chunyat a short time back was noted for robbers, and the young men still burn to distinguish themselves as successful cattle-lifters &c., so the chief of the town informs me, but the more settled aspect of affairs deters them from predatory attempts. Forts and towers built of stone are seen in many places, but the line of fortification on the southern aspect of the island (which divides the stream,) completed in part by Runjeet Singh, was evidently intended to command the approach by water to the Upper Punjaub. We have, however, met with no boats above Mooltan, except ferry boats, of which I keep a separate table. Made thirty miles in 10½ hours' steaming, channel good throughout the day; detention 1h. 45m. for fuel.

Sept. 20*th.*—The channel more winding to-day. A severe sand-storm set in early, and for a time rendered it impossible to see our way. The sun at ten o'clock, though distinctly seen, was of a pale blue color: its effulgence and heat were absorbed or dissipated by the medium it was seen through, and an impalpable dust filled the air, not unlike what is said to accompany volcanic eruptions in several parts of the world. The sun resumed its brightness in a few hours, the vessel perhaps passing clear of the storm. There was little wind except for an hour. The channel was intricate in approaching "Ramnuggur," more especially at Kala, an old town on the right bank. Made thirty-one miles in eleven hours' steaming.

Sept. 21*st.*—After several attempts to pass on, were obliged to secure at Ramnuggur Ghat at 10h. 55m., a new channel forming just above. This is usual also in Sinde, for the river Indus during this month is almost unnavigable, from the uncertainty as to the channel the body of water will ultimately pass down by. It drains down in many channels; some are deep, winding ruts, and others again broad and shallow. The steady fall of the river as October advances facilitates river navigation, the water gradually cutting a more permanent channel: this is, I should think, owing to its more uniform velocity, for when the river is suddenly swollen, and as speedily falls, the water changes its direction in particular places, and time is required (some three or four days) for a mere rapid to cut a channel. It is this circumstance (the alteration of the channel)

which makes local pilots so essential in the navigation of the Indus also. During this ascent of the Chenab for the first time, the man Dumuna (Flotilla pilot of Sukkur) was seldom wrong in his judgment, when the river was divided, as to where the greatest body of water was coming down, or, in other words, where the best channel would be found for onward progress; he also seldom erred in his opinion of the actual depth of water where the river was shallow, so that the vessel hardly ever grounded at full power. This proves that an experienced eye is the main necessary for efficient pilotage; indeed, I think in this (as in all others in the world of the same nature) it must be allowed that, practically speaking, a chart or plan can be no permanent guide; yet it is found, from continued experience on the Indus, that difficult reaches of that river retain their character year after year,—the bad places, as they were emphatically called, not varying very much: this remark has of course no reference to a rocky neighbourhood. From Ramnuggur I determined to cross over to Lahore, being in correspondence with the Resident, and anticipating that after a few days' delay the steamer would be able to reach the large town of Vizerabad, where fuel had been prepared.

Being invited by Mr. Lawrence to attend Durbar, I was presented with the usual provision money, namely 250 Nanakshai rupees, sweetmeats, &c.: the Resident told me I could not object, as it was customary. From this sum, as at Mooltan, presents were given to the servants, and the remainder will be paid into the treasury as I may be ordered to carry it to its account. The Durbar were restrained from visiting the steamer by understanding that one would come up the Ravee next season, and be close to the walls; they all appeared desirous of accompanying me over to see her.

Sept. 28th.—The cutting of the new channel during the last few days has caused the banks to fall in with a loud noise, which, in the stillness of the night, is incessant, somewhat like the reports of cannon in the distance. During a rainy day, the 25th September, the river rose ten inches, and the waters were quite red in color in this neighbourhood: in certain places, where the channel was confined by high banks, the rise was twenty inches, as the natives assured me; this was the case at the northern bunder of this town (Ramnuggur): the steamer is in a more extended part of the bed of the river, and the rise is less. The Ramnuggur traders came down to the steamer (about two miles) offering their goods, and wishing to make purchases.

Passed early up to the northern ghaut yesterday (27th,) and to-day

proceeded on to Vizerabad. The time occupied by steam between Ramnuggur and Vizerabad was six hours: the distance by water nineteen miles. Proceeded on, and secured at Dalawe for the night, having made twenty-six miles during nine hours' steaming.

Sept. 29th.—Proceeded early. The whole country well peopled. Water wheels and ploughing goes on here all night, and all day, from the abundance of men and animals for labor: they have now the advantage of a broad moonlight.

Abreast of the large town of Jellalpur, the river was found divided into several channels, and further progress with a vessel drawing more than two feet impossible at present, and the river is steadily falling. After persevering for four hours, returned back to Bagur ferry, and secured in ten feet water. It was a disappointment to me not being able to approach nearer Jamu, the former capital of Maharaja Goolab Singh. I had hoped the steamer would have been visible from its towers.

Sept. 30th.—Having instructed the officer in charge of the steamer to proceed up if any change should occur in the channel, I deemed it important to examine the river to its highest navigable point for any vessel: I therefore hired horses, and went by land to the fort of Akmur, which is built on a hill of rubble stone, commanding the river at the Jangi Ferry. An inspection of my sketch of the river will give more information than any discription, but I purpose forwarding a descriptive account of the river Chenab, from its highest navigable point, which I fix at a place called "Ghol," twelve miles from Jamu, and three miles above the "Tani," or tributary which passes through that town, and falls over a rocky bed into the Chenab.

The ferry of Ghol is six miles below the fort of Akmur: above Ghol the bed and banks of the river are composed of large shingle, and almost impassable by boat. This day I dropt down from Akmur (October 1st). There were several rapids with falls some inches of height in as many feet of distance, where no steamer could have passed, the depth being only one foot. The old boatman bargained for a high reward for loosing from Akmur ferry, and committing his exceedingly well-built and excellently-modelled boat to the mercies of a foaming torrent, as the river is in places above Ghol. He declared that Runjeet Singh was the only person who had gone to Vizerabad by water in his recollection. This tended to confirm the observation that at present there is no traffic on the Chenab by boat, but ferries are numerous. I persisted in de-

scending, and on several occasions considered the boat in great danger of wreck or something else over the rapids, but the boatmen were firm and collected. For all useful purposes, the descent of the river was a sufficient examination of it in its upper course. I may here mention that Mr. Lawrence, the Resident at Lahore, was kind enough to send with me a confidential servant of the Durbar of Lahore, and purwanahs to all the authorities, having the seal of Rajah Tej Sing, President of the Council, and others seals attached,—more especially with reference to assistance being given me in any examination for coal I might deem useful, but I did not feel justified, at this late season, in delaying the vessel. The lower hills are of recent formation, mere agglomerated rubble and clay. There is a place noted on Mr. Vigne's map as being a coal-field, but some days would be necessary to reach and examine it; I therefore contented myself with distributing specimens of the coal we had with us, and stimulating research by holding out the certainty of a reward if any was found. I also endeavoured to enlist an engineer officer surveying in the neighbourhood (a Lieutenant Robinson,) who from his energetic character I hope will determine the question of coal being in the spot indicated on Mr. Vigne's map if he has opportunity. There are few things that would tend more to the success of steam on the Indus than the discovery of a coal-field near water-carriage by one of the Punjaub rivers. In reference to the economy both of space and weight, three tons of coal are sufficient for the *Meanee's* daily steaming, whereas the weight of wood fuel for twelve hours' steaming is seven tons and four cwt. The place indicated by Mr. Vigne's map is near Rajawar, on the direct route to Cashmere, and seven to ten miles from an important tributary of the Chenab. It is not known whether this tributary would afford water carriage in the flood season, namely for four months, but it is said to be never dry throughout the year.

To effect its examination would occupy a week or ten days, and I am apprehensive of unauthorized delay at this late period, as the services of the steamer may be lost until the next rise of the river in April, if the water continues to fall as it has done for the last few days.

This ascent of the Chenab for the first time from the junction of the Sutlej to Vizerabad, may, I hope, be considered a successful one; it has occupied 113 hours' steaming, the distance by the river 351 miles—that is 3.1 nautical miles per hour; the number of hours lost by grounding having been ten. No accident has occurred, except when attempting the ascent of the Ravee, when the port wheel was damaged. From the abundance of cultivation, there is no jungle for fuel above Ramnuggur, dried dung being the common substitute. Fuel for steamers must be brought down from above Akmur fort during the flood season, for the river is not navigable for a laden boat above Ghol ferry after September, its bed being shallow and rocky. Steamers might, perhaps, at considerable risk, be taken up to Akmur fort in the high season, if their presence was thought of importance; but it appears to me that the disturbance in the river's channel from the influx of the mountain torrents in the

flood season would render the navigation peculiarly difficult above the manufacturing town of Jellalpoor, which is ten miles above Vizerabad; and for all commercial purposes this is high enough, for a good road to Cashmere passes from Jellalpoor through Rajoorah, and Jellalpoor is also on the direct line of traffic between Lahore and Peshawur; so that the *Meanee* steamer ascended to the highest point desirable for commercial purposes only.

I beg to forward herewith a list of Ferries, in a tabular form (marked B.), including mention of the best positions for wood fuel depots in the event of coal not being found. The table, you will observe, shews that in a distance of 351 miles by water, there are fifty-nine ferries established at an average of six miles apart. The boats are without exception of the low gunwaled, or zohruk kind, and are remarkably well built, capable of transporting any material. No boats of the weak construction of those found on the Upper Sutlej, called "chappoo," are used on this river.

One motive for my having been particular in recording all ferries, and the burthen of the boats, was from the fact that none of the latter were observed employed in conveying goods up or down the river, as on the Sutlej. In fact, there does not seem ever to have been traffic by the river.

The use of such a list as this would be obvious in the event of it being necessary to use all the ferries. If the boats mentioned here were secured, and sent down to the mouth, or sunk, the Chenab alone would form a serious obstacle to a military inroad. I enquired particularly for fordable places, and could hear of none. But, as a general rule, I beg to repeat a remark I made when reporting on the Sutlej—that, in my opinion, "fords are the forerunners of ferries, and create the ne-
"cessity for them; for where fords exist, in the low season, it is more
"than probable that circumstances of the neighbourhood, arising out of
"the existence of a ford (such as conveniences for travellers, &c.,) would
"render a ferry necessary and profitable in the high season," so that if fords do ever occur, they in all probability will be found where ferries are established, and noted on the accompanying plan and table.

With the return voyage report I shall offer a few general remarks on the probable success of steam navigation on both the Sutlej and Chenab.

The distance by water ascended by the *Meanee* in 113 hours' steaming was 351 miles, the steamer overcoming an average current of $2\frac{3}{4}$ miles an hour: this gives a rate of $3\frac{1}{8}$ per hour for the ascent in September.

I have the honor to be, &c.

(Signed) W. CHRISTOPHER, *Lieut. I. N.*,
1st Assistant Indus Flotilla,
on special duty in "Meanee" steamer.

(True Copy) (Signed) F. T. POWELL, *Commander I. N.*,
Commanding Indus Flotilla

(B.)

The river Chenab is not safe to ford, from quicksands in its bed, and I am informed the ferry-boats are had recourse to during the whole year; and I could not learn the river was fordable on foot anywhere.

The following is a table of the Ferries, with the number of boats on each, and their burthen, found in the river Chenab in September 1847; with remarks on fuel depots for steamers.

No.	Names of Ferries.	Distance by River.	No of Boats.	Aggregate Burthen of the Boats.	Remarks on Fuel Depots.
1	Above Akmur.....	2½ miles.	1	200	The river bed has rocks and
2	Akmur.....	0	2	500	rapids to Ghol Ferry.
3	Ghol..... ...(Depot.)	6	1	200	Recommended here for fuel,
4	Tola.....	8	2	300	but to this, and the three
5	Pulke Puttan.....	9½	2	350	succeeding depots, in the
6	Koja-ke-chuk...	10	1	200	absence of coal, wood fuel
7	Beli.....	13	5	600	must be brought down from
8	Marri.....(Depot)	18	5	525	the hills; dried dung being
9	Kuluwal.....	24	10	2,200	the native substitute for
10	Noushera.....	26	1	250	firing all over this populous
11	Sudra.....	31	7	1,775	district.
12	Vizerabad.....(Depot.)	41	14	5,300	
13	Khanka.....	50	4	700	
14	Ghurri.....	54	6	1,800	
15	Ramnuggur.....(Depot)	60	14	4,000	
16	Kala.....	72	1	300	
17	Khaderabad... (Depot.)	77	4	1,200	Khanda or Jhand fuel very
18	Bata..	84	1	250	good here.
19	Feroke.....	89	1	250	
20	Mahomedpur...(Depot.)	96	2	500	
21	Hazara.....	103	3	700	
22	Murud Buksh..(Depot.)	111	1	200	
23	Perodee...	117	2	350	
24	Shaik...	125	2	350	
25	Chinyat... .....(Depot.)	135	4	1,450	Fuel selling at 25 maunds
26	Jesaut.....	141	2	400	per rupee.
27	Sajanhi...	146	1	100	
28	Tali..... ... ...(Depot.)	157	2	350	To be at Mahomed Shah, four
29	Bali.....	172	1	200	miles below this; fuel sell-
30	Shaik Alli...	180	1	175	ing at 32 mds. per rupee.
31	Jhang Seala...(Depot.)	186	4	1,100	A capital town. Jungle near
32	Trimee..... ...(Depot.)	200	5	1,800	at hand.
33	Arreli.....	204	1	200	
34	Sultanpar.....	213	1	150	
35	Jelunpoor...	217	2	225	
36	Kakara...	224	1	150	
37	Hussiwali... ...(Depot.)	228	2	400	Very populous vicinity.
38	Ghar Maharaj.....	235	3	800	
39	Jugar.....	240	2	400	

No.	Names of Ferries.	Distance by River.	No of Boats.	Aggregate Burthen of the Boats.	Remarks on Fuel Depots.
40	Dubh.....	247	2	400	
41	Chuknorung...	254	1	200	
42	Sirdarpoor...	262	1	250	
43	Moindar.....	267	3	550	
44	Rangpur .. ..(Depot.)	273	2	350	A manufacturing town.
45	Ahmedabad...	278	1	200	
46	Sautian...	283	2	600	
47	Pipul Ghaut...	297	5	2,000	
48	Raj Ghaut.....(Depot.)	299	15	4,000	Ferry of Mooltan. Firewood selling in the town at 19 maunds the rupee.
49	Meeradabad...	305	1	200	
50	Shah Shebli.....	308	2	400	
51	Baluwan... ...(Depot.)	316	2	325	To be at Khandpur, two miles above this ferry.
52	Khangahr...	321	3	550	
53	Dundee.....	327	1	50	
54	Tibbah... ... ...(Depot.)	331	2	450	Good jungle near.
55	Mira Mullah...	336	3	600	
56	Lakida...	339	2	525	
57	Sultanpur.....	342	2	550	
58	Chini.....	348	1	150	
59	Bukri... ... ...(Depot.)	351	2	200	Depot here already, being junction of Sutlej with Chenab.
	Total.....	351	177	43,050	

(Signed.) W. Christopher, *Lieut. I. N.*,
1st Assistant Indus Flotilla.

(True Copy) (Signed) F. T. Powell, *Commander I. N.*,
Commanding Indus Flotilla.

(True Copies) (Signed) A. Malet, *Chief Secretary.*

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

ART. XI.—*Narrative of a Journey through parts of Persia and Kurdistan, undertaken by Commander* J. F. JONES, I. N., *of the Hon'ble Company's Steam Vessel "Nitocris," in company with Major* RAWLINSON, *Political Agent in Turkish Arabia.*—Dated Baghdad, 31st December, 1847.

[Presented by Government.]

THE accumulating disputes between Persia and Turkey in 1843 threatened to involve those Empires in a destructive war, that would ill accord with the interests of European States. The frontier had already become the scene of strife, on which acts both of aggression and retaliation were of daily occurrence. In this menacing attitude, the offer of a friendly mediation by Russia and England was accepted, and the Ministers of the contending parties prepared accordingly to submit the long-pending disputes to the arbitration of these great powers, who had invested with full authority a Commission for the purpose. Erzroum was determined on as the most convenient spot for the prosecution of its labors, and archives, records, and former treaties, were soon collected to aid in the complicated task. So vague and conflicting, however, was the evidence before the Commission, that it was deemed advisable to procure oral and more direct testimony from the Chiefs of some of the

Tribes located on the debateable grounds; and Colonel Taylor, then Resident at Baghdad, was written to on the subject. It was supposed that Thamar, a deposed Sheikh of the Cha'ab Arabs, would not only possess documents likely to be of service in settling that portion of the frontier which included the port of Mahomerah on the Haffār, but be well acquainted also with the geographical details of the country, and intimate with local traditions, which often prove of great value in territorial research. This individual, deposed from the Sheikhship, and deprived of his possessions by the Persian Ministers, was then a pensioner of the Turkish Government, and residing under its protection, at Basra, since his expulsion from the Cha'ab territory. I was dispatched in the vessel I commanded to bring the ex-Chief from Basra to Baghdad, in prosecution of his journey to Erzroum; and in 1844 Colonel Taylor's successor at Baghdad (Major Rawlinson, C. B.,) determined on proceeding personally to Ẓohab, another portion of the disputed territory, not only to collect information, but to procure an interview with the Amir of Kirmanshah, and thereby carry out the arrangements he had made with the local authority at Baghdad, for the preservation of peace in their respective Governments, as well as to prevent any collision among the tribes on the frontier, which might endanger the success of the Commission at Erzroum, or, at all events, protract its labors to an indefinite period.

Major Rawlinson contemplated proceeding on this duty in the summer of 1844, and as during that time (unless emergent service required her employment) the steam vessel which I had the honor to command underwent the necessary annual refit, I determined on complying with a requisition received from the Political Agent to accompany him on the journey. As this request was made solely with a view to the acquirement of a better geographical knowledge of this little-frequented, but highly interesting, portion of Kurdistan, (which is deplorably incorrect on our present maps) it was willingly acceded to, particularly as Major Rawlinson's political labors would not allow him sufficient time to enter fully also into the duties of the surveyor. The journey occupied nearly two months, during which time many interesting sites were visited, and their true positions astronomically obtained. On our return, a map, constructed from the results of the observations, was executed by Major Rawlinson and myself, and forwarded by that officer to H. M.'s Ambassador at Constantinople, expressly to assist the Commissioners at Erzroum in their enquiry; and the following pages, the simple record of our

daily progress, although uninteresting in themselves, I trust may prove of some value to the geographer, from the many bearings and astronomical observations interspersed throughout them.

BAGHDAD, 31*st December*, 1847. } (Signed) FELIX JONES,
H. C. Armed Steam Vessel "Nitocris." } *Commander, I. N.*

Notes made on a Journey to the Frontier of Turkey and Persia, through a part of Kurdistan.

August 19*th*, 1844.—We commence our journey from Baghdad with the thermometer at 109°, on a very oppressive day, and quit the city by the Mo'adhem gate at 5·43 P. M., accompanied by our friends,—who, however, soon left us. The party consists of Major Rawlinson, the Political Agent, Mr. H., a British Merchant, and myself; with a retinue amounting to some twenty in all, and a body of mounted troopers sent by the Pacha, not only as a guard of honor, but for protection against the Arab parties, which advançe at this time nearly to the walls of the city in search of plunder. At 6·13, before night setting in, observed the following bearings:—Road back, 211°, Minarets of Kathemein, 255°. After a halt of ten minutes we resumed our journey, travelling in a general direction of 13°. At 8·28, called another halt, to collect the party; and at 8·37 went on in a direction of 20°. Arrived at Khani-beni-sa'ad * at 10·18, somewhat fatigued, having passed over a level desert covered with mounds of ancient ruins, and intersected with the broken banks of canals since 8·37. Spread our carpets on the ground, with a clear blue sky the only canopy, and enjoyed a refreshing night's rest.

August 22*nd*.—Mounted at 2·50 A. M., to avoid the heat of the day. How deliciously pure is the atmosphere of this morning in the open desert, compared to the confined air we met within the walls of Baghdad! There is a beauty in the stillness, and it is a luxury to breathe. We held on a course of 20° to 5·25, when it was sufficiently light to obtain

* A few wells in the vicinity of this Khan afford for the cattle only a supply of brackish water. It is therefore necessary for the traveller, should he intend stopping at this stage, to provide himself with a supply from Baghdad, particularly during the hot season. Fresh water is, however, sometimes kept for sale at the Khan, brought in skins from the Diyaleh.

bearings in the bed of the Katul * canal, as follows: direction of the canal crossing the road, 342°; village of Hup-hup, 310°; Bahriz village, 102°. Proceeded after a halt of ten minutes, in the same direction as before, until 6 A. M., when we halted for another ten minutes in the bed of the great Nahrwan canal, and observed as follows: course of the Nahrwan, 351° 30′; Ziaret and tree in the distance, 228°. The river Diyaleh now breaks in on the canal a quarter of a mile below this. Went on to the ferry of Haweidha, which we reached at 6·45, passing Khani Syed about half a mile on our right. The Diyaleh is now very low, with high steep banks. It is fordable for horses about one hundred yards above this, and two miles below. This year the ferry is jointly farmed from Government by Futteh Agha and Khatil Agha. The former is the present Tufungehi Bashi of Baghdad. It is, however, stated to be a bad speculation, from the paucity of Persian Pilgrims crossing since the

* The Katul canal, as it is here termed, ran parallel with, and is equal in size to, the Nahrwan itself. It can be traced to some distance above the village of Sindiyeh, and is supposed to have been dug subsequent to the decay of the latter. This decay was probably caused by the Tigris leaving its old bed and taking a sweep further to the eastward, when it separated the Nahrwan from its sources at El Kaim and Kantaret-el-Rasasa. The Katul, indeed, appears to have extended from a little north of Sindiyeh only, to the "band" in the bed of the Diyaleh, as no traces of a sister canal to the Nahrwan are met with to the south of that river.

Though the name Katul is used only when speaking of the western canal, in this position, it applies also to the branches in the neighbourhood of Samarrah, at El Kaim, and Kantaret-el-Rasasa; indeed, Nahrwan and Katul are synonymous appellations to the north of the Diyaleh. Major Rawlinson, in his memoir on the site of the Atropatenian Ecbatana, has ingeniously shewn that the Katul, or the Katur (as it is often called,) is identical with the Toond of Theophanes, and the Tornadatus of Pliny; the first syllable Kan signifying in Persian "an excavation," and the modern town of Dar, situate close on the north bank of the canal, supplying, in its ancient appellative of Tur, the connecting link of the name. In its other appellation of Nahrwan we recognize the Nazzar of the campaigns of the Emperor Heraclius. See the work alluded to in the Royal Geographical Journal, Vol. X., part I.

I cannot, however, think that Nahrwan was only applied to the course of the canal south of the Diyaleh, for in the present day the northern parts of the canal are more frequently termed Nahrwan than Katul. Nor do I conceive that the waters of the Diyaleh alone were capable of supplying so extensive a canal; and, notwithstanding the distinct evidence of Yakut, am inclined to believe that they are one and the same canal, in which the waters of the Atheim and the Diyaleh were at that time absorbed. At the same time, however, we may infer that Katul or Katur is the more ancient name, and that Nahrwan superseded it generally only in the neighbourhood of Etesephon, the capital of Amishirwan, who, according to Yakut, both repaired and augmented it. Other names have been also applied to this gigantic canal, which strictly belong only to new ducts that were constructed on the decay of the old—for instance, El Dojm and Sid't Azez,—and Major Rawlinson states it as bearing that of Nahrsusah also.

For the etymology of Nahrwan we have Nahr, the Arabic equivalent of canal,

recent occupation of Kerbela by the Turks. From the ferry to Bakuba * is half a mile. This village boasts of some good gardens, and a few wretched houses embosomed in a date grove, watered by a cut from the Khorasan or Jelluleh canal. This canal, after passing Abu Khamis, is lost in the desert, about five hours south of this spot. Here we remained during the heat of the day, which was excessive—thermometer 110° in the shade in the afternoon. The observing the sun in the artificial horizon for latitude and longitude was absolute torture. As evening drew nigh, however, it became comparatively cool and pleasant. At 6·15 P. M. we resumed our journey, keeping more to the N. Eastward in a general direction of 44°. Passed a cut from the Khorasan at 6·45, and another at 7·10. At this time the road led us more to the Eastward for forty-five minutes, then diverged in a direction of 11°, when we crossed another cut from the Khorasan, leading to Karastel: here we remained to water the cattle, and to allow the party to close. The night was cool, with a brilliant moon. Started again in a direction of N. 22° E. till 10·55, when we encamped for the night.

August 23rd.—Left our ground at 3·50 A. M., continuing on the same line as the previous evening. At 4·35 crossed the dry bed of a canal, and at 5·7 halted for twenty minutes to observe the following bearings: direction of the road, 42° ; Dakka village on the Mahrut canal, distant three miles, 20½° ; brow of Dalahu, the culminating point of the Zayros range, 60¾°, distant about ninety miles; centre of the Band-i-Noah

and wan, the name of a town that formerly stood on its banks,—or probably wan is a contraction of the name of the monarch to whom Yakut ascribes its restoration.

If the canal were in existence at the time of the retreat of the 10,000 Greeks, then it would represent the Physens of Xenophon; and the site of Opis, as Major Rawlinson observes, would be marked by the ruins near Eski Baghdad. This is, however, a very doubtful question. I am inclined to view the canal as a work of a subsequent age, and think that the ruins of Opis must be sought for in some extensive vestiges near the junction of the Atheim (the more probable Physens) and the old bed of the Tigris, now termed Sh'taitha. Some very high mounds noticed by Dr. Ross, on his journey to Al Hadhr, in the vicinity of Waneh, will, in all probability, be found to correspond with the situation of the last city. This is, however, merely conjectural; for although we have a clue to comparatively modern towns when compared with Opis, we are yet unable to arrive at their positive identity. Even the Syro-Persian city erected by Khusru Amishirwan, at one day's march from his capital at Etesephon, and which boasted of a stately circus, baths, and magnificent abodes for the convenience and amusement of his Syrian captives, cannot at the present time be recognized, although it was built to perpetuate the joint names of the monarch and his recent conquest of Antioch, the then capital of Syria.—See Gibbon's "Decline and Fall of the Roman Empire," Chap. XLII.

* Bakuba, by double altitudes of the ⊙, is in latitude 32° 45′ 10″ N., and 13′ 52″ East of Baghdad.

mountains, 76°; Minaret of Shehraban, 76½°; Dastagerd,* or Eski Baghdad, distant four miles, 115°; Zindan, or Palace of Bebdarakh, five miles distant, 135°; Tomb of Benat-el-Husseyn, one and a quarter mile distant, 237½°; Sun's centre at rising, for variation of the compass, 79° 20′. Re-mounting at 5·28 A. M., we crossed the Mahrut canal by a brick bridge of one arch; and then altering our route to 81°, reached the village of Shehraban at 6·45. Took up our quarters in the best house the place afforded, but a miserable hovel. The day, too, was excessively hot, and the myriads of flies that swarmed around prevented us enjoying the rest we so much needed. We however obtained the usual observations. The Shehraban canal bisects the village, and is lost a little to the south of it. It formerly watered Eski Baghdad, and, I believe, supplied the Zindan† also, but we are informed here that a cut from the Mahrut passed the latter. Shehraban‡ is supposed to occupy the site of the ancient Apollonya. Many mounds covered with broken pottery, and the remains of numerous canals crossing each other in fantastic lines, mark it as the former abode of a numerous and industrious population. The now barren and densely heated plain, highly cultivated as it no

* The identification of Dastagerd in the present ruins termed Eski Baghdad, is fully ascertained from numerous Oriental authors. See Major Rawlinson's Memoir in Vol X. of Royal Geographical Journal. It was a royal seat in the time of the ill-fated Khusru Parviz, and was celebrated for its wealth and magnificence. On the success of Heraclius, it was desolated by the Roman troops. Three hundred standards taken from the towns and armies of the Western Empire, and a numerous multitude of Christian captives, which had graced the triumphs of Khusru's arms in Syria, were restored to liberty. Khusru himself, contrary to expectation, escaped through a hole in the wall of his palace, and sought safety in an ignominious flight, nine days prior to the arrival of the Roman army from Theophanes. See Gibbon's Decline and Fall, Chap XLVI., page 517.

† Position which the Roman army under the Emperor Heraclius occupied after the defeat and flight of Khusru Parviz from Dastagerd. See note in Gour's Theophanes, quoted in Major Rawlinson's Memoir on the Atropatenian Ecbatana, page 95.

‡ The name Ταμερὰ employed in the MSS of Theophanes, and which in the Memoir above alluded to is recognized by Major Rawlinson as equivalent to the Oriental Tamerreh or Tamerret, I conceive is nothing more than a Greek contraction of the name of the district, and not applicable to any particular town. Ταμερὰ in all probability is a compound of the Arabic تمر Ταπτ date, and بلاض Ετὰ, "land" or "province," and may well have been applied to this locality, from the fact that in coming from either Europe or the N. E. part of Persia, the date-groves are here first met with in a flourishing condition. The name, indeed, may have been written thus in the Greek MS. of Theophanes, in the same way as we have Ναζβαν for Nahrwan. Shehraban, in its miserable village, and stunted date-groves, reflects sadly on the present condition of this once fruitful province. By double altitudes of the ⊙ its position was ascertained to be in latitude 34° 00′ 9″ North, and by meridian altitude 33° 58′ 45″ N. Its chronometrical difference from Baghdad is 31′ 18″ East.

doubt was, afforded in bygone times some pleasant retreats, under the shelter of its groves, from the scorching heats of summer, which we, alas! feel and must bear, without a hope of relief. The date tree, so luxuriant and fruitful in the neighbourhood of Baghdad, is here a stunted and a forlorn object. A headless minaret stands in the centre of the village, a fit emblem of its fallen condition. At 6·25, the declining rays of the sun induced us to quit our miserable abode for the saddle. Our course now lay in a direction of 58°, over and through some extensive mounds of ruin, probably the remains of the ancient Hilta, until 7·5, when we diverged to 64°, a table flat on the Hamrin range, then bearing 33°. Continued on this course to 7·37, when we crossed the Haruniyeh,* and shortly after the Belad Ruz,† canals; the latter by a fine brick bridge recently built at the expense of an opulent Merchant of Baghdad for the convenience of pilgrims visiting the holy cities of Najuf and Kerbela, and, like most other works in this country, was erected from pious and charitable motives. The Belad Ruz canal is the most northerly and easterly of all the cuts from the left Bank of the Diyaleh south of the Hamrin, and being the nearest to the base of the range, has consequently the deepest bed, with high steep banks. It waters the country as far south as Mendalli, and, I believe, formerly extended far below it. Between the Belad Ruz and the last station noted, the country became more undulating, and the road proportionably tortuous, winding from N. E. to S. E.

It became necessary to collect the party after crossing the Belad Ruz and before entering the defiles of the Hamrin,‡ which are notorious for harbouring parties that may be out in search of plunder. We halted therefore until 8·30, and sufficient time and opportunity was afforded to the Rustams of the party to alarm the nervous by horrible and incredible tales of robbery and murder. We entered the much-dreaded gorge

* Named after the Khalif Harun-al-Rashid, who is said to have first excavated it.

† Bara Soth of Theophanes, and the Baraz-rud of Yakut. See Major Rawlinson's Memoir on the Atropatenian Ecbatana, page 95.

‡ An undulating barren ridge of tertiary formation, from 300 to 500 feet of elevation, extending in a direction from S. E to N. W., across the level plains of Assyria. The ridge appears to be a spur thrown off from the skirts of the Zagros chain in the neighbourhood of Mendalli, and can be traced, in almost a direct line, to within a short distance of the ancient city of Al Hadhr in Mesopotamia. It is severed by the Tigris, by the 'Atheim, and by the Diyaleh. That portion of the range west of the Tigris bears the name of Jebal Mak'hul, and is considerably more el[illegible] to the S. Eastward.

at 9h.,* and continued winding slowly, and with proper caution, through its hillocks and defiles until 10·30, when we encamped on the plain beyond. The silence that had pervaded the party in the dreaded gorge now gave place to boisterous tales of individual prowess in former rencontres with the banditti of the desert: and it was amusing to witness the bold front of one or two of the party, whose countenances but half an hour previous wore an aspect as pale as the chaste luminary that was shining above them, and who would have fled at the first alarm.

August 24th.—After a cool and refreshing night mounted at 4·30 A. M., and stopped at a dry cut from the Diyaleh at 5·20, for the following bearings: direction of the road came, and onwards, 22°; isolated Tumulus† on the right bank of the Diyaleh, 327°; village of Kizl'robat,

* The river Diyaleh breaks through the ridge about one and a half miles N. W. by W. of this position, in a full and impetuous stream. To this spot we must attach Herodotus's tale of the labors of the great Cyrus, who spent nearly a whole year in diverting the river from its original bed into 360 channels, because his favorite horse was drowned in attempting to cross it. No other river will so well accord with the description of Herodotus on the ancient Gyndes, and the remains of a dam across the stream, constructed in a remote age, may continue a monument of the wrath and perseverance of that monarch. The Khalis, the Belad-ruz, the Mah-rut, the Haruniyeh, and numerous other canals, again branching out into smaller ducts, have their origin at, and a little below, the dam. In the present day even, their number may amount to that described by the historian.

Rennell, in his Geography of Herodotus, Vol. II., Sec XIII., page 431, identifies the modern Diyaleh with the Gyndes of antiquity; but the testimony of Major Rawlinson, who has travelled through most of the countries coursed by its waters, is almost conclusive evidence of their being one and the same river, and yet our maps still continue disfigured by a Gyndes falling into the Tigris between the Diyaleh and the Kerkha river, whereas, from my own experience, I confidently affirm that with the exception of the Um'l Khanzir, the Nahri Sa'ad (insignificant torrents reaching to the Tigris during the winter months only,) and some outlets from the great lake of Haweza, no river is to be met with in the intervening space falling into the Tigris from sources in the mountains of Persia. The Stud, a branch of the Tigris connected with the lake of Haweza, has, however, been known, from sudden rises of the Kerkha river occurring while the Tigris is in a very low state, *at times* to fall into the parent stream, and may have given rise to the supposition that the Stud had sources *per se* instead of being derived from the Tigris. See a note further on.

† These tumuli, so often met with in Asia Minor, Syria, Kurdistan, and Persia, are singular and interesting relics of a former age. Some have been fortified, and exhibit at the present time massive ruins on their summits. Others have been erected over distinguished individuals, who may have died, or have fallen in the numerous conflicts that these localities have witnessed, and the sepulchral urns so often found entombed in these piles give evidence of the fact. The most ancient notice, I believe, that we possess regarding these singular structures, is found in Diod. Sic., Chap. I. book II. page 111. He ascribes their origin to Semiramis, and the custom was doubtless followed by subsequent nations, until interment superseded the

20°; peak of Baziyan, 22°; bluff end of Bamu, 41½°; brow of Dalahu, 63°; Sun at rising, for variation, 79¼°; centre of Band-i-Noah, 81°30′; distant peak to the S. Eastward, supposed to be Manisht, 119°30′. Proceeded onwards at 5·33, passing over cultivated grounds watered by the small canal Merjaniyeh, a cut from the Diyaleh. At 6·30 reached Kiz'l-robat,* a small village farmed this year by our friend Kader Pacha, who received us very kindly, and entertained us with true Kurdish hospitality. Though we required rest after night travelling, we were as usual doomed to disappointment—the excessive heat and annoying flies preventing the obtaining any: we however managed to drag through a long and weary day in conversation with our host, and in working out the observations taken on the journey. Most of the Kurds are inquisitive, but not impertinently so, and we derived some amusement in answering the numerous queries of our entertainer, who is a well-educated man, and conversant with most of the oriental authors. Of high birth and well connected, he was at one time selected to govern the Turco-Kurdish Pachalic of Sulimaniyeh, which gave him his present title of Pacha; but from some intrigue he never reached his court. Devotedly attached to hunting, he spends most of his time in some favored retreat, or in superintending his farm. His appearance is as patriarchal as his habits are abstemious, and his manners mild and conciliating. No wonder, then, that he is beloved by his ryots and followers. We had known Kader Pacha in Baghdad, and were delighted again to meet him on his ground, and share the hospitality which was warmly extended to us. After partaking of a farewell meal in his company, and discussing the policy of European States, which he is extremely fond of, we took a reluctant leave; the old man, with a falcon on his wrist, accompanying us some distance on the road, attended by a troop of armed retainers, and some

pyreal form of disposing of the dead. Diodorus, in speaking of the customs of Semiramis, remarks: "In champaign countries, she would raise eminences, on which she would sometimes build sepulchres for her officers and commanders, and at other times towns and cities. Through her whole expeditions she always used to raise an ascent, upon which she pitched her own pavilion, that from thence she might have a view of her whole army. Many things which she performed in Asia remain to this day, and are called Semiramis's works."

I shall have occasion again to allude to these singular structures in other parts of the Journal, more particularly when journeying through the plain of Shahrizur, but I may here add, that on the plains of Waterloo, traces of these ancient usages, commemorative of that glorious event, and of those who fell, may be witnessed at the present time, in the modern structures that have been raised since 1815.

* Kiz'l-robat, by double altitudes of the ⊙, is in latitude 34° 10′ 51″ N., by its Mer. Alt. 34° 10′ 59″ N., and 40′ 27″ East of Baghdad. The magnetic variation in 1844 was 3° 5′ West.

goodly hounds,—either to enjoy the pastimes of the field, to make a foray,* or to repel attack, as chance or inclination may direct him.

Mounting at 6·20, our course lay in a direction of 80°. At 6·40, the small canal Merjaniyeh was crossed. It leaves the Diyaleh about two miles below the junction of the A'bi Holwan and A'bi Shirwan. These two streams are the main branches of the Diyaleh river, which name appears to apply only to the trunk stream, as it is unknown beyond the frontier town of Khanakin. The A'bi Shirwan, coming from the mountains near Sinna, meets the A'bi Holwan about four miles N. Eastward of Kiz'l-robat: at a short distance below their junction, the remains of a large ancient canal may be traced; and two conspicuous mounds of ruins (probably on the site of the ancient Jellaleh†) stand elevated considerably above the plain. Continuing the same direction as before, at 7h. we ascended over another elevated ridge of sandstone and pebbles, similar to, and running parallel with, the Hamrin range. These ridges appear as stepping stones to the approach to the mountains, the alternate ridges being from eight to five miles apart, and the intervening space occupied by a fine plain susceptible of cultivation. After halting twenty-five minutes to collect the party, we proceeded in a direction from 56° to 22°, the road varying between these points (as we crossed the ridges alluded to) until 11·5, when we entered the alluvial valley of the Holwan. From this to Khanakin the course was 55°. At midnight we entered the town and crossed the Holwan by a splendid bridge of nine arches. This bridge has recently been repaired, and is the only modern structure that can claim the attention of the traveller in this country. The town, or rather village, of Haji-Kara‡ stands

* In Herodotus and Xenophon, and indeed in most ancient as well as in comparatively modern writers, we are informed that the amusements of the chase were not incompatible with the toils of war. We learn from Heeren that monarchs as well as whole armies were devoted to the pursuit; and our inimitable Scott, in his tales of the Scotish border, has drawn a true picture of frontier life, as applicable to the barbarous Kurds of the present day as to the semi-civilized fraternity that infested the marshes between England and Scotland during the unsettled times prior to the reign of the first James.

† Jellaleh was a strong position in the time of the Sassanian Kings of Persia. It was here that a part of the army which came to the relief of the unfortunate Yezdijerd, the last monarch of the house of Sassan, was captured after the decisive battle of Kadesiyeh, A. D. 636, by Hashem, nephew of Saád the Arabian General.—See history of Yezdijerd in the Ant. Hist., page 120.

‡ The garden-house in the village of Haji-Kara stands in latitude 34° 20′ 47″ N. by double altitudes of the ⊙; by its Mer. Alt. in 34° 20′ 37″ N. Longitudinal difference East of Baghdad, 53′ 10″; and the variation of the needle in 1844 was found to be 2° 10′ West.

opposite Khanakin, on the Persian side of the stream. It has a fine Khan for the reception of goods and accommodation of the merchant or traveller. Khanakin and Haji-Kara are now the frontier towns lying on the main road between Turkey and Persia, though, strictly speaking, in accordance with the old treaties, the Pachalic of Zohab, as far as the old fort of Sarmil at the head of the Taki-Girrah pass, is undoubtedly Turkish soil. This portion of the country was lost to Turkey in 1821, by the invasion of the Persian troops under Mahomed Ali Mirza, then Prince of Kirmanshah. This energetic prince had reached as far as this point on his advance against Baghdad when he was attacked with cholera and died in a few hours. The hopes and ambition of Persia died with him, and his army returned disheartened to Kirmanshah. The territory, however, which he then gained, has since been unwillingly recognized as Persian soil, from inability in the Turkish ruler of Baghdad to re-conquer it; and the surrounding tribes, taking advantage of this, in some measure, debateable soil, repair to the neighbourhood for the adjustment of their disputes either by negociation or by the sword. The latter is, however, the most often resorted to, and this locality is, therefore, one of the most disturbed in either district. The disputes between tribe and tribe are not only adjusted here, but tribes in rebellion against either Government find it a convenient spot for the exercise of their lawless habits, as by crossing the barrier, they effectually secure themselves from pursuit. This insecurity will at all times prevail, unless, indeed, the Turkish Governor of Baghdad and the Persian Amir of Kirmanshah mutually act for the coercion of the tribes, and the repose of the frontier. But this is not the policy of either, as these aggressions not only tend to keep alive the national hatred and antipathy, but serve, in some measure, as a screen to the grasping power of the despots in either province, who fail not secretly to foment them.* Major Rawlinson's mission will, I fear, be a laborious one. Possessing the confidence of both parties, his abilities and knowledge of Native character well fit him for the task, which, if prosperous, will prove of great benefit to the Commissioners at Erzroum: the habits, hatreds, prejudices, and conflicting testimonies, however, of the tribes and factions that he is endeavouring

* This district, as well as others bordering the mountain ranges of the Zagros, has in all ages been the scene of rapine, bloodshed, and strife. Both Arrian and Strabo repeatedly allude to these disturbed regions, and the lawless habits of the Cassei, who maintained then, as at present, an independence notwithstanding their vicinity to the capital. Alexander the Great, who finally conquered them, experienced much difficulty in keeping them under his yoke.—See Heeren, Vol. I., page 245—from Arrian's History of Alexander.

to reconcile, independent of their difference of faith, form a mass of incongruous material ill adapted to ensure the desired success. Both Khanakin and Haji-Kara form considerable intrepôts for trade, and many of the influential houses at Baghdad and Kirmanshah have their Agents located here. With this object it is that Mr. H. has accompanied us on this journey: he is about to establish an agency for the collection of the produce of the Kurdish mountains, returning, in exchange, the manufactures of England. Gums, galls, and other drugs, abound in this vicinity, and I believe only want an enterprising individual and an honest Agent (a "rara avis" in this terris,) to make them a source of considerable profit.

August 25th.—Rose early, and retired to the shade of the garden as being preferable to the house during the heat of the day. Major Rawlinson received numerous visits from the principal people residing in the town and its vicinity, who inform us that the roads between this and Kasri-Shirin are infested with plundering parties of the Jaf and Hamawand tribes, rendering it unsafe to proceed without an escort. This will delay us a little. The escort that accompanied us from Baghdad returns from this, their further service being useless beyond the Turkish frontier. A report reached us to-day that one of our kassids had been robbed of his letters, and severely wounded, by a party of Jaf a few days back: I trust this may prove incorrect, as matters will be still more difficult to arrange. A little after sunset the expected escort arrived, having had a skirmish with a plundering party in the morning. A fine lad, nearly related to the chief of Kirrind, was severely wounded by a spear through his lungs. They confirm the report of the robbery of the kassid, but deny that he was wounded as we heard this morning: on the contrary, they state that he was kindly received by the Jaf chiefs when carried before them, and that the robbers were punished with the loss of their ears. Which of these reports is the true one, yet remains doubtful. Entertained our new friends at dinner; the commandant of the party proving to be a former protegé of Major Rawlinson's when serving in Persia seven years ago. This worthy, a Guran of the Ali-Ilahi sect, appeared much pleased at meeting his old patron and quondam commander, and, delighting in the good cheer before him, recounted, with evident satisfaction, tales of former service, in which both had mutually shared. From the terrace of the house in which we lodged the following bearings were obtained:—☉ at setting, for the variation of the needle, 285¾°; Tomb of Imam Abbas, one and a quarter mile distant, 276°; a tumulus called Tappel Kaleh, where the canal exhausts itself in irrigation, 211°, distant

four miles; an isolated peak* on this side of the Shirwan, 321½°; brow of Dalahu, 68¾°; point of Ban-Zerdah, 63¾°; centre of the Band-i-Noah, 95½°; Shahri-zur hill, 118°.

August 26th.—Left Haji-Kara, after a few hours' sleep, at 1·45 A. M., attended by our escort. Two kafilahs, taking advantage of our strong party, accompany us. With a brilliant moon we threaded our way, over disordered heaps and ridges of sandstone and pebbles, in a general direction between N. N. E. and E. N. E. The latter course was most prevalent, and the road ascended considerably the whole way. At 4·45 passed an enclosure of rough stones, dignified with the name of Kaleh Sabzi. It is now unoccupied, having been built to keep in check the numerous marauding parties that frequent this locality. It has failed, however, in its object, for it is difficult to procure a garrison to remain, for a length of time, on so lonely a spot,—their own fears, coupled with the threats of the tribes around, being sufficient excuse for its abandonment. A similar enclosure in ruins, named Kaleh Shamili, alike deserted, borders the road twenty minutes farther on. At 6·30, the Holwan river touches the road, and for a short time winds along it. Its waters, unlike the Tigris, are dark and clear, and run with some rapidity over a hard pebbly bottom. In the spring and winter it must discharge a considerable body of water, but it is now comparatively shallow and about twenty yards broad. At 7 A. M., reached the caravanserai at Kasri-Shirin† —a miserable halting-place, in whose blackened and smoke-begrimed vaults we are, however, glad to shelter ourselves from the fierce heat, although vermin and every other abomination surround us. We were compelled, from the excessive heat, to remain in the Khan during the day, which we devoted to the working out of our astronomical observations and in taking others for the determining of the position of this place. The thermometer was 98° in the coolest spot we could find, but when exposed to the hot wind that blew all day, it rose to 115°. In the evening we visited the ruins in the vicinity of the Khan, about a quarter of a mile north of the caravanserai. A quadrangular mound, evidently of great antiquity, exposing at its sides large blocks of well-cut masonry, first excited our attention. This mound is detached from the

* Hill of Dakkeh.

† Kasri-Shirin stands in latitude 34° 30′ 6″ N. by double altitudes of the ⊙; by meridian altitude 34° 30′ 27″ N. Its longitude East of Baghdad was made 1° 06′ 15″. Rich, however, places it eleven miles further to the East, but I think the former may be relied on. Rich's latitude of the same place is 34° 30′ 39″ North.—See his Kurdistan and Nineveh, Vol. II., page 267.

more extensive, but, in my opinion, the more modern, remains to the N. W., by either a fosse or a natural ravine. On the south of it is a miserable hamlet, inhabited by a few wretched Kurds, built on the debris of the former buildings, supported on solid arches, which are here and there exposed by the Holwan having encroached on the right bank. N.N.W. of the Kasr, or mound abovementioned, about half a mile distant, the remains of a square brick building are still standing, but roofless, having an arched doorway on each side. This I presume to have been a fire-temple, from the remains of one, in all respects similar, which I had seen near Humaniyeh* on the Tigris. A large oblong enclosure extends from this edifice, the area of which may be two miles. Its walls are from ten to fifteen feet high at present, very thick and solid, and composed of large unhewn boulders of a reddish-black stone, similar to basalt, embedded in a coarse mortar of a very hard and durable nature. These walls present a singular appearance in their present state, but may have been coated with plaster when originally built. We had not time to examine thoroughly the whole of the interesting remains in this neighhourhood. Rich, however, who spent some days both here and at Haoush Kerek, a similar ruin, has entered more into details. In our short survey we could trace no remains of buildings, excepting a quadrangle, which has been termed "the palace," within the enclosure, but were inclined to consider it as having been constructed as a receptacle for wild animals. The native tradition assigns its erection to Khusru Parviz,† who here is

* Kubeh't-el-Nar, about five miles West of the remains of a Saracenic city, built upon the site of a Babylonian town on the peninsula of Humaniyeh, close to the right bank of the Tigris. Its name implies "Temple or apartment of Fire."

† A note in Rich's Kurdistan and Nineveh, vol. II., page 264, on this subject, is worth transcribing:—

"Khusru Parviz, King of Persia, of the Sassanian dynasty, was the grandson of Chosroes Amishirwan. He married a daughter of the Emperor Mauricis, who is generally supposed to be the same person as the heroine of the eastern romances of Khusru and Shirin.

"This eastern heroine has likewise had the honor of being sung in German verse by M. Joseph Von Hammer, in his poem of 'Sheran,' and whoever may be desirous of knowing more of this lady, and of the poets who have treated of her history, will find ample details on the subject in a work just published by that distinguished and indefatigable Orientalist, entitled 'The history of Ottoman Poetry.'

"The town, which is supposed to have been built by Khusru Parviz, in honor of Shirin, and to have been called after her, is described as situated between the towns of Holwan and Khanakin. He is reported to have said to Shirin—'Royalty would be a glorious thing, if it endured for ever': to which she answered—'If it had endured for ever, it would never have come to us.' Khusru Parviz is the Chosroes II. of the Greeks. By the Byzantine writers he is said to have married a daughter of the Emperor Mauricis, named Irene, which the Persians after-

said to have enjoyed the amusement of the chase, and the society of the beautiful Shirin. To the east of the enclosure a substantial aqueduct conducted the waters of the Holwan from near their source to the royal park. It is not improbable, indeed, that the area of the enclosure then contained a profusion of luxuriant trees, similar to the venerated shikargahs of the late Amirs of Scinde on the banks of the Indus, requiring a lavish supply of water, not only for their own existence on so arid a soil as that in the vicinity of the Kasr, but to maintain alive the numerous animals that were imprisoned beneath their shade, and were destined for the sport of the royal hunter. The remains of this aqueduct, built on a wall of solid masonry, can now be traced for many miles, and the place, though not affording many objects of interest to the antiquary, yields some amusement to the traveller from the many stories of love and the chase connected with it, which have been founded on the romantic attachment that the Sassanian monarch entertained for his Christian Queen, and on her partiality for the enamoured Firhad of Persian romance. A similar ruin, termed Haoush Kerek, is situate about six and a half miles west of Kasri-Shirin. Mr. Rich has fully described it in his Kurdistan and Nineveh, Vol. II., page 270.

August 27th.—In the saddle at 2·25 A. M., resuming our march in a very serpentine direction to the N. E. At 3·30, touched upon the remains of the aqueduct leading to Kasri-Shirin. The duct or canal was about a foot broad: many of the stones that composed it are still scattered around. The wall that supported it is a massive structure, and is still in some places four or five feet above the level of the country.* Our course, after leaving the aqueduct, turned more to the S. E., at no great distance from it, and led us again to the bank of the Holwan, at 3·45. From this time until 4·35, altering our direction over disordered heaps and barren mounds between east and E. S. E., when we passed a "tappel" called by

wards converted into Shirin, 'sweet,' or agreeable. The Roman accounts however say that she was a public dancer. Khusru Parviz was killed by his son, A. D. 627.

"The monarchs of Medea and Persia appear to have partaken of the nomade habits of their subjects from a remote antiquity to the present time. Their annual migrations according to the seasons were conducted with a pomp and magnificence unknown in Europe; and their parks and pleasure-houses in all parts of the Empire were on such a large scale, as not only to serve for the confinement of every species of game, but contained such a space within their walls as to admit of their armies being reviewed."—See Heeren, Vol. I., Chap. II., page 402.

* It was prolonged beyond Kasri-Shirin, as far as Haoush Kerek—at least we are informed so.

the Kurds Jellaleh,* and said to be half way between Kasri-Shirin and Sar-Pul. Many vestiges of former habitations are seen around us, on the crests and ridges which are thrown off from the north end of the Shanbalah † ranges. This we rounded at 6·30, emerging from the cinder-like detritus of the hills into the alluvial valley of the Holwan. Through the plain we pursued a general direction of 102°, crossing many branches of the Holwan that are here distributed over the plain for agricultural purposes, at 7·10 the wretched caravanserai or Khan of Puli Zohab was reached. For the last hour we had been escorted by a large party of Jaf horsemen, under the chief of the tribe, Mahmud Beg.

The contrast between the Arab and the Kurd is, in appearance, in favor of the latter. Wearing a gayer and better style of dress,—the large turban surmounting, in most instances, fine and manly features,—with a profusion of arms and tinsel finery,—attached to their spirited, but ill-bred horses,—prepossesses one in their favor at first sight; but for hardiness and endurance, either in the fight or in the chase, the small, ill-clad, but sinewy Arab stands as unrivalled in his own person, as does the metal and temper of his pure steed excel that of all other eastern breeds.

Numerous visitors from the Jaf and Hamawand Kurds, who are in this neighbourhood, gave Major Rawlinson full occupation throughout the day. Being compelled to receive them all in a single room, the only tenable apartment the Khan afforded, rendered the place, from its crowded state, so insufferably hot, that obtaining the sleep that we much required after our night's journey was out of the question: complaints, grievances, threats, and persuasions, were poured forth in Turkish, Kurdish, and Persian, by the chiefs and their numerous followers;—

* This may be the scene of the defeat of part of Yezdijerd's army, and not the position, bearing nearly the same name, mentioned in page 258 of this Journal. I am inclined to view the former as the ruins of a much earlier town.

† Sambulos of Tacitus, and the reputed scene of the exploits of Hercules and his invincible band. Gotarzes, the Parthian monarch, was here employed in offering sacrifices when his Kingdom was invaded by Meherdates. The name signifies an ear of wheat, and Major Rawlinson has ingeniously shewn, in his notes on a March into Kharistan, page 43, its connection with the earliest principles of religious adoration in the east. Doubtless many local deities were worshiped in the earlier ages on the banks of the Gilan river; and if in Shanbalah or Sanbalah, as signifying "an ear of wheat," and being the characteristic of fecundity, we can trace the cause of its dedication to Venus, and its representation on the coins of Nannaia, we may, I think, in the name of Mountanarish, the western boundary of the Gilan river, equally trace the name of the goddess, as represented by Anaitis, and the Persian Anahia, though the Major has not remarked it. It is, however, merely conjectural, and suggested entirely by a perusal of the clever notes, to which I have before alluded, in the Royal Geographical Journal.

angry declamations, accompanied by hostile menaces, would, no doubt, have ended in open rupture between the parties, did not the presence of the Major restrain them. I had taken the usual daily observations for determining the position of the place, and endeavoured to work them out, but the Babel-like confusion within the solitary apartment ill accorded with the quiet so necessary to logarithmic calculation, so I resigned it in despair: indeed, I place but little confidence in the results eventually obtained from these observations,* as the influx of the multitude into the Khan caused the mercury of the artificial horizon to tremble in such a degree as to preclude almost an approach to correctness. As evening drew nigh our friends gradually left us, and we were enabled to leave the confined space we had all day occupied, with the thermometer at 105°, for the terrace of the Khan. A sumptuous meal, to which that luxury, ice, brought from the mountains above us, contributed not a little, soon dispelled the feverish languor which had crept over the party from fatigue and the deprivation of sleep. We were again in the saddle at 8 P. M.

The Khans of Sar-Puli Zohab, for there are two, stand in the valley of the Holwan, on the right bank of the river, at the foot of a spur projecting from the high range of the Band-i-Noah to the N. W. They are surrounded by a few huts, and some reed villages of Bazilan Kurds occupy the neighbouring plain. In themselves they are altogether unworthy of notice, but the locality is one of great interest. The projecting spur abovementioned is called the Dukkani Daud range, and is covered with figures and inscriptions of the Kaiamanand Sassanian ages. The Holwan, flowing from its source in the defile of Rijab, tumbles with great violence through a gorge in the range close to the Khans; and on the left bank of the stream, opposite to them, the remains of the Calah of Asshur,† and the Halah of the Israelitish captivity, one of the eight primeval cities of the world, are still washed by its waters. Parts of the ancient buildings are seen in section, from the river having

* By these results the bridge at Sar-Puli Zohab is in latitude 34° 26′ N., and East of Baghdad 1° 20′ 56″ N.

† See Major Rawlinson's Notes in the Royal Geographical Journal, on a March from Zohab to Khuzistan. In a later era it was known to the Persians and Arabs by the name of Holwan, and Dr Ross, who visited this part of the country in 1835, states it to be sometimes called Samangan and Hiliwan.—As late as the Sassanian ages it continued a city of considerable importance. Yezdijerd, the last of that dynasty, fled to it on his defeat by Wakasibu Saád, and we may therefore date its decline from the invasion of the Arab hordes, A. D. 636, when Mahomedanism succeeded to the religion of Zoroaster.

undermined their bases; and bricks, bearing the cuneiform inscriptions, similar to those of Babylon, abound in the vicinity. This city was coeval with Babylon, Nineveh, and Resen,* and is frequently mentioned by ancient and the more modern oriental authors. For its identity and discovery we are indebted to Major Rawlinson, who has, in his interesting march from Zohab to Khuzistan, given a very full and elaborate description of the various monuments of antiquity in this neighbourhood. With great regret we were compelled to leave these relics without examining them minutely, although portions of them can be seen indistinctly from the Khan, the great heat and our other occupations preventing an inspection of them until sunset, at which time a visit would have been useless, as, to be seen in perfection, requires the full blaze of the noonday sun.

Crossing the Holwan by the bridge near the Khan at 8·5 P. M., we passed through the gorge in the Dukkani Daud range, in which the river flows, and kept a course between 110° and 146°, through the plain of Bishiweh. This plain occupies the space between the low spur denominated the Dukkani Daud to the West, and the heights of Zagros on the East. It is plentifully watered by mountain streams, and well cultivated. It terminates at the foot of the Taki Girrah (Gates of Zagros) pass, which we reached at 10·20; having passed an excavated sepulchre,† supposed to have once contained a sarcophagus in the Dukkani Daud range, about two and a half miles S. E. of Sari-pul. The moon having not yet risen prevented a sight of this remarkable spot, but as we commenced the ascent of the farfamed pass, that luminary burst forth in all her splendour above the oak-crowned crests of the Zagros.

The ascent proved rather a laborious one, over a zigzag and very rough road, formed of loose masses of fallen rock, and large boulders of stone like gigantic pebbles. The elevation of the road may be about 20°; and, in its present state, is certainly ill adapted for the passage of either troops or artillery.

A little labour and expense would, however, place it in as efficient a state as it no doubt was in the remote ages when Cyrus, Darius Hystaspes, and Alexander, led their mail-clad legions, their elephant trains, and unwieldy engines of war through its defiles, when conquest or the

* Genesis X. v. 2 to 12; and for other scriptural notices refer to 2nd Kings, Chap. XVII. v. 6 to 11.—2nd Chron. v. 26.—B. C 710-715.

† Royal Geographical Journal, Part I. of 1839, page 38-39.

suppression of rebellious subjects induced them to quit the genial climate of royal Ecbatana for a descent on the more fertile, but more sultry, plains of Babylonia and Assyria. It was then, as it is now, the main pass on the high road between those provinces and the royal city, and formed the boundary between Media and Assyria; and in the subsequent dynasties of the Seleucidæ, the Parthians, and the Sassanians, it undoubtedly held a conspicuous place in the boundary compacts entered into by the successive monarchs that have ruled over these disturbed tracts: and, strictly speaking, at the present time forms the line of demarcation between the Ottoman and the Persian empires.

The ascent of the most difficult part of the pass occupied us exactly an hour from the Bishiweh plain, and in this short time the temperature had varied some 25°. The oppressive heats of the plains were exchanged for the bracing air of the mountains, and the wearied spirits of the party rose in the same proportion: even the very mules, notwithstanding the labor they had undergone in the ascent, seemed to gain renewed vigour, and now trudged lightly along with their heavy loads at a quickened pace.

Half way up the pass stands a venerable arch of white marble, from whence its name Taki Girrah.** It is no doubt of very great antiquity, but bears neither inscription or design. The architecture, though not of a superior order, is massive and well-defined. It was, however, viewed with interest from the historical associations probably connected with it, contrasting vividly with its present bleached and time-worn appearance.

Quitting the short angular turns that we had been compelled to take on the ascent of the pass, at 11·20 we entered the narrow defile, or gorge, which severs the higher range of Mount Zagros from the lofty crest of the Band-i-Noah Chain. This chain is the most westerly of the Persian mountains, and forms the great barrier between the alluvial plains of Assyria east of the Tigris, now termed Irak Arabia, and the mountainous districts of Persia.

The scenery at this time became very grand. On either hand the dark foliage of the oak, overspreading the sides and summits of the mountains, was here and there relieved by a bare abutting crag. A brilliant moon over head reflected its beams on the pale "arch holding the road," now left honoured in its solitude a thousand feet below us. The road continued to ascend through the gorge in a general direction

* See Major Rawlinson's Notes in Royal Geographical Journal, before quoted.

of 130°; until we arrived at the village and Khan* of Surkhi-Dezr, at midnight. Here we halted for the night, glad enough to exchange the light clothing in which we had been clad since leaving Baghdad for the warm beds that awaited us, spread out under the canopy of heaven on the house-tops of the village. Sleep, however, did not visit us as soon as we expected, although we had now been without rest for twenty-four hours,—the splendid scenery around, and the delightful change in the climate, serving as a subject of conversation for some time after we had retired to rest.

August 28th.—Resumed our march through the defile at 5h., over a very rough road, and so narrow at times that the caravan was compelled to proceed in single file. The morning was very cool and pleasant, a fine easterly wind blowing down the defile. At 6·55 we arrived at the ruins of the old fort of Sar-mil, anciently called Tur. From Surkhi-Dezr to this place the general bearing is 135°. On the route we enquired of our guides the present name of the Zagros range to our left, and were surprised at hearing the appellation of Zarr applied to it. Major Rawlinson deems this the original of the Greek Zagros, which is, indeed, probable. At the fortress of Sar-mil the space between the mountain ranges gradually expands as they extend to the S. E. into the rich plain of Kirrind, abounding in water, and studded with the neat villages of the Kirrind ryots. Sar-mil is mentioned in the old Turco-Persian treaties

* The remains of a fire temple are seen close to the Khan, supported on massive arches. This interesting relic of Magian adoration is on a spot will selected by

"Those who made their altars the high places of earth, o'er-gazing mountains."

The fondness of the early Persians for elevated sites whereon to perform their religious observances has often been remarked, and Herodotus, in speaking of them, remarks :—

"Their custom is to offer, from the summits of the highest mountains, sacrifices to Jove, distinguishing by that appellation all the expanse of the firmament. They also adore the sun, the moon, earth, fire, water, and the winds, which may be termed their original deities."—Book I., Chap. 131.

He, however, shortly afterwards distinctly states that they possessed no temples, and sacrificed without the aid of fire. But in these respects we may presume the historian has derived his information from a wrong source,—for fire temples must have originated when the system which Zoroaster is reputed to have founded, or reformed only, caused a revolution in the more ancient forms of worship. Indeed, long prior to the era of Herodotus, we have undoubted evidence in scripture history of the existence of temples, and the employment of fire as a sacred element in connection with the Mithraic worship of the sun. In Chap. 23, Kings II., v. 5, 10, 11, 19,—some seventy-five years before Cyrus ascended the throne of Persia, and consequently nearly a century and a half before Herodotus was

as the boundary of their respective empires in this part, and a garrison formerly occupied the spot. We were informed, with great gravity, by a greybeard of our party, that an old well, now filled with rubbish, was actually stored with charcoal for the delineation of the frontier line when the last treaty was framed; nor did our laughing and incredulity at all disconcert him.

At 7·5, remounting, we pushed on at a more rapid pace through the plain, in the direction of the Kirrind gardens, which bore from Sar-mil 129°. We were met on our way by many of the chief people of the place, headed by two of the late Governor's sons, who managed their horses with all the ease and dexterity of accomplished horsemen, although the eldest is barely twelve years of age.

At 8·40 we turned abruptly to the North, towards the town, which now shewed itself seated in a deep and romantic gorge of the heights of Zagros, and 9h. found us located in the best room of the Governor's house, surrounded by all the luxuries the place afforded. The owner of the mansion is however not here, but a state prisoner at the capital, Teheran. The case of this individual is a harsh one, but by no means solitary in the annals of Persian despotism. About three years ago he left Kirrind for a neighbouring village, and during his absence the Amir of Kirman-

born,—we have the mode of the Mithraic worship distinctly characterised almost in the words of that author himself: and the houses of the high places which Josiah destroyed cannot but signify the temples that had become dedicated to the new doctrines attending the worship of the elements.

Rollin, (Art. IV., Chap. IV, Book IV., of his Ant. Hist.) in quoting from Xenophon, notices the ambiguity of the ancient authors, but would also lead us to suppose that temples were inconsistent with the right worship of the deity, who, according to the tenets of Zoroaster, should be adored in the open air; and relates that Xerxes wantonly destroyed the Grecian temples as being incompatible with ordained observances: yet he subsequently admits that one of the great effects of the reformation of Zoroaster was the institution of temples in which the sacred fire was carefully preserved.

We are aware, at the same time, that the destruction of the Grecian edifices took place when Xerxes made his inroads into Greece; for we have authentic accounts of the barbarous retaliation that Alexander the Great, in a fit of intoxication, practiced after the fall of Persepolis. The reasons, therefore, that induced Xerxes to raze the temples of Greece, must be assigned, I think, to the acts of the iconoclast rather than be viewed in the same category as Xenophon,—for Zoroaster, although we are ignorant of the precise period of his advent, is well known to have flourished long before the reign of Xerxes,—indeed in an age prior perhaps to the Median, if not even anterior to the Assyrian monarchy: we may consequently suppose the monarch was a follower of the reformed religion, and perhaps these esteemed edifices, whose existence, "ab initio," appears to be requisite to the full working of the system.

shah visited the place on a tour through the province. The character of the Amir was stamped with the usual vicious propensities of Persian functionaries, and those who resided in the province under his rule had submitted for a long time, with tolerable grace, to every species of tyranny and oppression. The Ali Ilahi, to which sect the Kirrindis belong, had suffered more than their Mahomedan neighbours, in having been called upon to submit their wives and daughters to the embraces of the imperious Amir. Such conduct naturally irritated these bold mountaineers, and two individuals that were sent to remonstrate with the haughty Prince were pistolled on the spot. This led to his immediate assassination by the Kirrind people, who, fearful of the consequences, left their houses and sought shelter in the mountains. At this time the chief of the Kirrindis returned, and, hearing the state of affairs, sided with his clansmen, and this constitutes his whole offence. By oaths and promises of safety he was induced, after some time, to visit the capital, and, I need scarcely add, suffered, for his credulity, an incarceration that will, I fear, end only with his life. His family of four sons and a daughter still reside here, and came this morning to visit Major Rawlinson: kneeling together on the floor of the apartment, the two eldest boys took hold of the skirt of the Major's coat, and, with oriental reverence, pressing it to their lips, requested, with tears in their eyes, his intercession for the liberation of their father. The attitude and entreaty of these fine boys was painfully interesting, and will no doubt induce the old friend and guest of their father to exert himself for his release.

Kirrind* has an extremely pretty appearance, being situated in a deep gorge of the Zarr range. The houses, though small, are neat, and built in terraces on the slope of the gorge, with the naked and scarped rock rising abruptly above them. The aspect of the village resembles that of Beilan, in a gorge of the Amanus range, leading from the Bay of Skanderun into Northern Syria. Rich gardens extend up the defile and along the base of the mountain, which produce a variety of fruits, including the celebrated stoneless grape known as that of Kirrind. The willow and lofty poplar attain a considerable size on the margin of a mountain stream that bisects the village, and is afterwards turned off into smaller channels for the supply of the gardens [redacted]. Several copious springs, issuing from the plain, which is [redacted] broad, add their waters to numerous mountain [redacted]

* Karine of Isidore of Charax. The village is in [redacted] altitudes of the ⊙. By Merid. Alt. 34° 16′ 2[redacted] East of Baghdad is 1° 40′ 05″.

sources of the Abi Kirrind, the N. W. tributary of the Kerkha* river. It joins the main river, after flowing past Harunabad, in the neighbourhood of Rudbar, about due east of Baghdad, and south of Kirmanshah.

The temperature in the room at sunrise was 66°, and at 3 P. M., the hottest time, only 85° ; a delightful change after a long residence in sultry Baghdad. A mild easterly wind prevails throughout the nights, and is followed by a refreshing westerly breeze that lasts during the day. These are as regular as the land and sea-breezes experienced on the Malabar coast of India.

We spent two days in the company of our friends the Kirrindis, and were much pleased at the frank and hospitable reception they extended to us. It is true Major Rawlinson had spent some time amongst them when serving in Persia, and, indeed, commanded a regiment of Gurans, which he raised and trained, composed solely of these mountaineers,

* The Kerkha river is generally recognized as the ancient Choaspes. It was until lately navigable as far as Hawiza, but by the "bund" or dyke at that place bursting in 1839 its waters have been distributed over the whose adjacent country, —but principally accumulated in a large lake formed (by the Tigris passing through the Hud, and the Duarij stream) in the low ground laying between the Tigris and Hawiza. This lake inundates the whole country as far South as Kurna, and is connected again with the Tigris by numerous outlets, some of considerable size, which debouch in the neighbourhood of the tomb of Ezra. The Suaib is however the principal mouth of the Kerkha river. It joins the Shat al Arab five miles below the junction of the Tigris and Euphrates.

The Hud, spoken of in the above note, has given rise to much controversy. Many travellers have treated it as a distinct river, and the compilers of a recent work entitled "Ancient History," erroneously identify it with the Gyndes of antiquity. The Hud indeed is but a branch of the Tigris, and the term river, as frequently applied to it, is an egregious misnomer. In latitude 31° 52′ N. the Tigris turns abruptly to the East, and continues this course for sixteen miles to the mouth of the Hud in the same latitude, whence it again suddenly turns to the south. This formation of the bed of the Tigris then sufficiently accounts for the existence of the Hud in the angle of its diverging courses. The Hud, from where it leaves the Tigris, pursues a direction generally of E. S. E., but becomes divided into many smaller branches a few miles distant from the main stream—where the country is considerably depressed and below the margin of the Tigris. In 1841, I descended the Hud in the Steamer *Nitocris*, but was compelled to retrace my course *against the stream* when I had advanced but twenty miles, from its intricate and numerous turnings. A few miles further, I was informed, would have conducted me into the Lake of Hawiza, but, impeded as I was by numerous dykes, with scarcely sufficient room to turn the vessel in, and surrounded by hostile tribes ever ready to take advantage of any accident that might happen to the vessel, I felt that the risk incurred would be more than commensurate with its advantages, even did the depth of the lake permit of its navigation by the steamer, which is a very doubtful point. The karadeh, a small boat resembling a canoe, in use among the tribes inhabiting these marshes, I am told, performs the distance between the mouth of the Hud and Hawiza in three or four days. On the subject of the Hud, see also page 256, where it is alluded to in a note.

many of our present friends having formed part of the corps. If the Ali Ilahi sect are jealous of enquiry into the mysterious tenets of their faith, they are tolerant of all other religions, and exempt from the prejudices of the fanatic Shiah. This evening the chief people entertained us at dinner, and sent for a party of dancing girls for our diversion. They were by no means handsome, but sang some lively Arab and Kurdish airs, accompanying them with the castanets. These people appear to be itinerant gypsies, and lead a nomade life in this part of Persian Kurdistan. They are termed Susimani, and speak a dialect very similar to the vernacular Hindustani.* When young, the women are said to be pretty, and obtain a precarious livelihood solely by the exercise of their Paphian vocations. The better classes of the profession are, however, sometimes attached to the houses of the influential men, to afford amusement to their families, and lead a life of comparative enjoyment, though by no means a virtuous one; virtue, indeed, is unknown among them.

We were busily employed during our stay here in testing the performance of our little chronometer, which proved to be satisfactory, considering that it had not only been exposed to a sudden change of temperature, but had also sustained some unavoidable shocks. Two routes, both of equal interest, lay before us on the morrow, but as the Calhurs,

* Rich, on his journey to Persepolis, met with a tribe of Iliyat, called Zergers, or goldsmiths, who seemed, by their dialect and habits, to be a tribe of gypsies. He gives many phrases as obtained from them that would assimilate them to the Susimani Kurds, and, at the same time, shew a remarkable affinity to Hindustani. Those that I can recognize I copy from his work entitled "Babylon and Persepolis," page 259:—

Ave or Ane—Come. Ia imper—Go. Keni jeti—where are you going? Sugherdan—what have you done? Yagh—Fire. Panee—Water.

In the New Monthly Magazine for June 1831, I observe, too, in a notice of Barrow's work on the Gypsies of Spain, that this remarkable tribe bears the appellation of Zincali or Zingali. In them perhaps we may trace a connection with the Zengani families inhabiting this part of Kurdistan, and who, though now professing Mahomedanism, fomerly exercised the Susimani *virtues*, and, indeed, own to a gypsy origin. The interchange of the *g* for the *c*, and the *l* for *n*, in the name, is well known in all Eastern dialects, and Mr. Barrow, though not venturing to pronounce on the origin of the family, points out its connection with the East from the Sanscrit roots that abound in the language of the tribe. Portions of this interesting race at times wander into the vicinity of Baghdad, and are known to the Arabs of the plains by the names of Zinkani and Kouli; quasi Kaouli or Kabuli, from Kabul, in Affghanistan, whence they are said to have originally wandered. It will be seen, too, from Colonel Harriot's interesting paper and vocabulary in the Royal Asiatic Journal, that the language of the English gypsy is identical with the Sanscrit and Persian tongues: on enquiry, most of our slang terms, as derived from this interesting race, will be traceable to some of the most primitive dialects that we are at present acquainted with.

a large tribe, possessing the country to the south, are in rebellion, and in arms against the Kirmanshah Government, we are informed that it will be dangerous to attempt the more frequented road by Harunabad with so large a caravan. At this intelligence we are much disappointed, for one object in coming this way is to obtain a stone that is reported to be covered with inscriptions at the above place. After some debate, a small party of Gurans agree to accompany Mr. H. by the lower road to Harunabad, where he will endeavour to obtain the coveted stone, or, at all events, procure a copy of the legend inscribed upon it; while the baggage proceeds by an easy pass to the south, on to the capital, Gahwarah, where Major Rawlinson and myself will join it by a direct, but more difficult, route across the high range of the Zagros.

August 29th.—The parties making the detour according to the above arrangement, having left before us, Major Rawlinson and myself, at 2·15, started on a course due north, up one of the most steep ascents that probably a horse has ever gone; in fact, the pace partook more of the clamber than the walk, over rough loose stones or masses of rock, direct above the village of Kirrind to the summit of the Zagros. After much floundering, and serious risk, both to man and horse, we gained the top at 3·10, and halted to rest the jaded beasts near a conspicuous old oak, which stands here in solitary grandeur. What a magnificent view is now before us! To the East and N. E., at a short distance, lay the table flats occupying the crests of the Dalahu range, with the solitary hamlet of Biwanij in the plain of the same name, immediately under us, and exhibiting in its smoke the only trace of animation around. The barren peaks of the Kal'eh Kazi group, less high, but more remote, and seen through the break where the Abi Zemkan forces itself, holds a central place; while the lofty mountains of Shahu and Parrow, at the distances of ninety and sixty miles respectively, terminate the prospect in this direction. To the S. E. and South, the rich plains of Kirrind and Harunabad, celebrated in antiquity as the theatres of war and pageant, gradually fade in the indistinct features of the Calhur province, or are hid in the shade of the lofty Zagros, over which are seen the distant peaks of Manisht and the Luristan chain of the Kebur Kuh; and, bounding the horizon to the west, thousands of feet below us, like a vast sea, extending as far as the eye can compass, are the fertile and long-coveted districts of Babylonia and Assyria. What a rich tableau is here spread before the gaze of the conqueror! I question, however, if any of the many monarchs who, from time to time, have swayed the destinies of

Media, or of Persia, ever saw displayed, at a single glance, as we do now, the various provinces they so often traversed with their legions, or which had been gained for them by the grasping ambition of their ancestors.

A round of bearings was taken from this point as follows:—North brow of Dalahu, extending at 325½° to 339°; high part of the Band-i-Noah range, 264°; a high peak, supposed to be that of Manisht, 193½° brow of the Kebur Kuh, 165°; another bluff remarkable point, 2°, open to its right; peak of Parrow, over Kirmanshah, 84½°; peak of Kal'eh Kaz near the pass, 78°; approximate direction of Gahwarah, 83°; village of Biwanij, in the plain below, distant about 10 miles, 330°; highest point of the Shahu mountains, 17°.

At 3·30, leading our horses, we commenced the descent into the Biwanij plain. The descent we found equally as abrupt as the western face, and riding was therefore out of the question. On reaching the plain, which from the summit of the range appeared quite level, but now exposed to us undulating ridges with abrupt acclivities, we mounted, and took the direction of Gahwarah, as noted in the bearings. After leaving the plain of Biwanij, the road gradually ascends over the lower slopes abutting from the S. E. prong of the Dalahu heights. These slopes, as well as the higher ranges, are thickly studded with the dwarf oak, in pleasing contrast with the scrub-clothed soil of the intermediate plain. Forded the Zemkan river, whose source is in the plain of Biwanij, at 5·35, and 10 minutes after passed the hamlet of Gowraju. Traversing the same kind of country, alternately over hill and dale, we reached Gahwarah at 6·45, having been met at some distance from the town by the Guran chief, with a numerous retinue, both mounted and on foot. The presence of their old Colonel among them was hailed with universal delight by these wild mountaineers, and was testified by wild shouts, sham encounters, and firing of their matchlocks, until we reached the halting place. The journey to-day, though made in the heat of the sun, was by no means disagreeably warm; and an ample meal, furnished by the chief, who partook of it with us, soon shewed, by its appearance, or rather by its disappearance, that our appetites had been rendered keen by the bracing air of the mountains.

Gahwarah,* though scarcely deserving the name of a town, is the capital of the Guran country. It may contain about 300 houses, which,

* Gahwarah is in latitude 34° 20′ 35″ N., by double altitudes of the ⊙; by Mer. Alt. 34° 20′ 13″ N.; and is east of Bagdad 1° 56′ 05.″

like those of Kirrind, are flat-roofed, and rise in terraces on the slope of the mountain. It is the residence of the Chief, Shabas Khan, who is also the head of the Guran levies when the Amir of Kirmanshah requires their services in the field. Ten years ago, when the Persian forces were commanded by British officers, Major Rawlinson was appointed to raise a regiment of Gurans for the service of the State. This he accomplished, after some trouble, and resided in this locality until he had brought his new corps into a state of perfection almost unknown in these regions. He afterwards led this regiment through the intricate passes of Luristan and Susiana, and to this journey, and to his residence among the Gurans, we are indebted for his admirable paper* on the comparative Geography and historical notices of some of the most interesting countries alluded to by ancient writers, and which had seldom, if ever, before been trodden by the foot of an European. A great change has, however, happened since the British officers were withdrawn, and this corps, that before consisted of near 800 rank and file, now scarcely mustered 350 bayonets. Oppression, wages in arrear, irregular service, and a thorough absence of system, are the chief causes of this decline. The same causes have operated, in a more or less degree, on the whole Persian army, under the inbecile Government of the present Shah, and the tyrannical conduct of provincial Governors. At the present time Mohab Ali Khan, the Amir of this province, is compelled to confine himself to the city of Kirmanshah, the large tribe of the Calhurs having risen—not to seek redress for imaginary grievances, but—to obtain the justice which has hitherto been denied them. The extent to which taxation had of late been raised, rendered it utterly impossible for the poor cultivators to comply with the increased demands; and then the rapacious agents of so worthy a master, equally alive to their own interests, resorted to a system which in a very short time left the brave but oppressed ryot nothing but his sword to subsist by. Can it be wondered at, then, if that weapon was appealed to? The system adopted by these worthies, who were mostly confidential Sirbaz of Azerbijan, and not remarkably celebrated for humanity, should not be left unrecorded. On collecting the taxes, how few were enabled to realise the sum demanded from the augmentation of the imposts, I have already shewn. It became necessary to borrow the deficiency to save the individual from a prison. Advantage, too, was taken of the time for levying these dues when the crops were nearly ripe, and when

* Notes on a March from Zohab to Khuzistan, in the Royal Geographical Journal, Vol. IX. 1839, Part I.

the abstraction of the ryot from the scene of his toil would be attended by utter ruin. In this alternative there was no remedy but to obtain from the Agent himself, who—having foreseen, and indeed created, the calamity—was ever ready to lend, at an exorbitant interest, the sum required; the flocks, crops, and even the household goods, of the borrower being at the same time mortgaged as a guarantee for payment. The result can easily be anticipated: debt accumulated on debt, and within a year the whole property of a once thriving family became a prey to the officers of Government who should have protected it! Families thus driven from their peaceful abodes infested the highways in search of plunder.

Troops were sent to quell the disorders, which had originated in the acts of Government, and, failing in their object, from the nomade habits of the marauders, the tribe to which they belonged were not only compelled to refund a sum equivalent to the property said to have been stolen, but, at the same time, were bound in the payment of a large amount for the future transgressions of the delinquents. The grasping policy of the Amir or his subordinates soon found pretences for the acquirement of a penalty which coercion could alone obtain,—the attempts at which occasioned a general appeal to arms, and finally ended in open rebellion. The state of the troops in the province, from the causes already related, was unequal to the emergency, and the Amir was thus compelled, by a disgraceful compromise, to pacify the insurgents until reinforcements are obtained from the capital. Before, however, this visitation takes place, the tribe will have abandoned the soil for some more peaceful district, leaving nothing but ruined hovels and smoking fields for the oppressor to glut his vengeance upon. Thus are individuals driven to crime, whole families ruined, tribes forced to quit the territory derived from their ancestors; and to these causes we must, in a great measure, assign the depopulation and impoverishment both of Persia and Turkey.

All this is, however, a digression from [illegible] which I now resume. Of the same elevat[illegible] lies at the foot of what may be termed t[illegible] range, the culminating point of the Zagros. [illegible] point of Ban-zardeh, the fo[illegible] to an irregular horse-sho[illegible] prongs gradually curving [illegible] The village of Kirrind [illegible]

ern prong, while the interior, or concavity, is filled up by undulating es from the eastern ridge, terminating in the plain of Biwanij.

In this concavity, the Abi Zemkan takes its rise, and, running to the E., at a distance of three miles west of the town of Gahwarah, to the ame length south of it, turns abruptly to the north, and again passes lose to it to the eastward, thus making a circuit of the S. E. prong of he mountain.* Confined between the east face of Dalahu and the steep barren cliffs of the Kal'eh Kazi chain to the eastward, it pursues then nearly a direct course of north until past the oblique declivities abutting from the N. E. brow of Dalahu, in the neighbourhood of Bibiyan and Kal'eh Zanjir, when it receives many petty adjuncts, and in the winter becomes a considerable stream. It then diverges to the west and N. W., keeping the latter direction through the vale of Darneh,† bounded by the undulating peaks of the Pushti Kuh to the west, and by the precipitous range near which the ancient city of Darneh stood, to the right; finally falling into the Abi-Shirwan, or upper Diyaleh, opposite the base of Nilambu range, a few miles south of Gundar, in the Sulimaniyeh territory, and about 100 yards east, or above the ancient bridge of eight arches that in former times spanned the Abi-Shirwan, and conducted directly from Sulimaniyeh to Kirmanshah. The Guran Kurds‡ are represented as a brave, frank, and hospitable, race, and, like most mountaineers, are hardy and enduring. They are, however, prone to quarrel, and serious frays, terminating in bloodshed, and the almost total extinction of the rival factions, are said to be of frequent occurrence. An injury is seldom forgotten, and will, sooner or later, be revenged. These contentions generally originate either in domestic broils or clan hatreds, and are at times secretly encouraged by the Persian authorities, who find it difficult to coerce them in their mountain fastnesses, and whose policy is, therefore, to keep them in check by

* The ranges on either side of the Zemkan expose vertical limestone strata, much abraded by the action of the stream.

† See Herodotus in Clio. 189. In describing the Gyndes he expressly states that that river ran through the country of the Darneans; we can, therefore, I think, without being far wrong, identify the Diyaleh with the Gyndes of antiquity. The ruins of Darneh are still to be seen, it is said, on the left bank of the Zemkan, and an old man now residing at Az-galleh is pointed out as the last lineal descendant of the proud family of the Darneans, who so long ruled over the district At all events the name is well known, and Major Rawlinson also assigns the Darna of Ptolemy to this locality. Royal Geographical Journal, Vol. IX., Part I., page 29.

‡ Like most of the Kurdish tribes, they occasionally wear, when at war, an armour consisting of a chain head-piece and a shirt of mail.

intestine discord. Very little is known of the peculiar and mysterious tenets of their faith, which appears to embody the various doctrines of Judaism, of Christ, and of the Shiah Mahomedans, from the time of Moses to that of the Ali. They are termed Ali Ilahis, and are supposed by Major Rawlinson to be of Jewish origin. It is said their religion enjoins that, at certain periods, they shall congregate at night in a particular spot. At these times the greatest license is said to prevail, and the promiscuous intercourse of the sexes to form part of the ceremonies prescribed by their singular creed. In this respect they resemble in their faith the Ancyrians of Syria, if the conjectural stories related of them have any foundation on truth. It is certain, however, that a more than masonic secresy is maintained among them in regard to the mystical rites and ceremonies connected with their religion, and that they are, moreover, exceedingly jealous of inquisitive inquiries on the subject.* Both the Ali Ilahi of the Zagros and the Ancyrians, inhabiting the lofty range of the same name to north of the Lebanon, in Syria, may, indeed, be remnants of the early Babylonians, whom we know on their religious festivals indulged in every species of libertinism and licentiousness;† and these, on the irruption of the Medes and Persians, and the spread of the Magian theory over the land, for the purpose of enjoying in peace the worship of their fathers, may have retired to the almost inaccessible but

* I remember, when travelling in Syria with the late Dr Floyd, in 1840, that an Ancyrian guide had been furnished to conduct me from Antioch to Suadujeh. Having heard much of these singular people, and being anxious to verify some of the stories related of them, when arrived at a secluded spot amid the beautiful scenery bordering on the Orontes, I ventured to enquire, by a general question, the nature of the faith existing in the mountain. I had been conversing with him before on other topics connected with the Government and the road, to which he responded readily, but I had no sooner changed the subject to what affected him personally, than I found myself alone, the guide having sprung into a neighbouring copse, and was instantly lost to view. I afterwards regretted the curiosity that had prompted me, for I lost my way, and had to remain all night exposed to a violent thunder-storm.

† Herodotus, Book I., Chap. 199, and many other authors, describe the curious customs of the Babylonians on their religious festivals. At these times money was collected and applied to sacred purposes. The same orgies may be observed at the present day in many of the Hindu temples, not only during the great festivals, but at other times, when a profit is derived from the intercourse of pilgrims and visitors with the professional actresses attendant at the various shrines, who are selected for their beauty, and devoted to this service from an early age.

Even the more civilized Greeks, during the Greco-Macedonian occupation of this country, on the great festivals dedicated to Bacchus and Serapis, abandoned themselves on this soil to every species of license and extravagance; and, in celebrating the rites of the Dioscuri, they probably excelled their Babylonian archetypes in the extent to which their debaucheries were carried.

secluded summits of the highest ranges on either hand. The Ali Ilahis, as well as the Ancyrians, when sojourning in Mahomedan cities, outwardly conform to the ceremonies of the established faith. They also adopt the deportment and dress of their Mahomedan rulers, so as not to excite the prejudices of the fanatic people.* I have, however, heard both parties regret the necessity that compelled them to resort to the deception, and have even seen the former mimic the devotional prostrations of the "*true believer.*"

The Ali Ilahi, though generally congregated on and around the higher parts of the Zagros, sometimes descend, in the winter, to the more genial climate of the neighbouring plains. A few scattered families were also met with by Major Rawlinson in Luristan, but, I believe, the Gurans seldom venture into the more northern districts beyond Zohab.†

Whatever the religious code of the Guran may be, it is evident that his moral one is not of a very high order, and that the precepts inculcated in the Persian youth during the age of the greater Cyrus have been either forgotten or perverted in the lapse of ages. The art of drawing

* The Ali Ilahi, when in their own villages, if we may judge by their acts, do not deny themselves the use of wine or spirits, nor do they abstain from the prohibited food of the Koran; on the contrary, they indulge freely both in swine's flesh and intoxicating liquors.

The features of the Ali Ilahi, as well as of the adjoining tribe of Calhur, certainly display a Jewish cast, and warrant the supposition of their Jewish origin; and their own traditions and Judaical doctrines tend to strengthen the inference. If not, therefore, of a Babylonian stock, we must view them as a remnant of the Samaritan captivity. Asiatic history abounds in instances of the depopulation of conquered towns by victorious monarchs, and in the substitution of other races for the primitive occupants, in order to maintain a peaceful possession of the newly acquired country. See Heeren on the Constitution of the Medo-Persian Empire, Chap. II., page 4. Scripture History also furnishes us with many examples of such transactions, particularly when Shalmaneser, King of Assyria, (2d Kings, Chap. XVII., v. 24,) took men from Babylon, Cuthah, Ava, Amath, and Seporvaim, and placed them in the cities of Samaria instead of the Jewish captives that he removed into Assyria. In verse 6 of the same chapter it expressly states that he placed them in Halah and Habor. The former has been already identified with the modern Holwan, (R. G. Journal, Vol. IX., Part I., page 35) and the Calah of remote antiquity, and there is little room left to doubt but that both the Ali Ilahi Gurans and the large tribe of Calhur are the descendants of the Samaritan captives. The retention of their religion and mysterious usages, will correspond well with the anathemas launched against them by Moses in Deuteronomy, Chap. XXVIII., v. 36-37, where it says, "The Lord shall bring thee, and the King which thou shalt set over thee, unto a nation which thou, neither thy fathers, have known, and there shalt thou serve other Gods, wood and stone, and thou shalt become an astonishment, a proverb, and a byeword, among all nations whither the Lord shall lead thee." See also Levit. 26, v. 32, 33, and 39.

† Bibiyan, Kal'eh-Zanjir, and Palan, are their most northern positions.

the bow, indeed, is still retained, but, instead of the warlike weapon of the name, it is that now termed "par excellence" the "long-bow." The strict regard to truth is, in fact, as foreign to them, and to the whole Persian nation, at the present time, as is the use of the primitive weapon of our forefathers. Dr. Ross, who visited the Guran camp in 1835, furnishes me with a characteristic anecdote of these people, but it will equally apply to the whole Persian nation, who individually and collectively, from the Khan to the fellah, are unworthy of belief. I copy it from his journal in his own words:—"To-day had a good specimen of "Kurdish oaths. The Prince of Kirmanshah had sent an official to en- "quire into an accusation laid by some travellers against certain people "in Zohab (naming every individual), of having beaten and robbed them "while lodging in their houses. The officer was very fierce on his ar- "rival, and nothing but the restoration of the property, and severe pun- "ishment of the delinquents, would satisfy him. Sulliman Khan, the "blind Chief of the Guran Kurds, who rents the Zohab districts for "10,000 tomauns, ordered the accused before him. To-day they arrived "in custody of the Prince's official, who, however, seemed wonderfully "changed, and said he should be satisfied of the innocence of the sus- "pected parties if they gave their oaths: the fact is, in the mean time he "had been bribed. The Kazi was called, and they, being Sunis,* were "to be sworn on the Koran by the three divorces of their wives and by "the Khan's head. The former was readily agreed to: to the latter they "demurred a little, but upon the Khan saying, 'if you are not guilty, "swear,' the spokesman said, 'Oh yes; whatever the Khan says we will "swear to.' After the usual ablutions, no Koran could be had among "nearly 2000 of the faithful. At last Major Rawlinson produced one, "and the ceremony was completed, a small stone being thrown down for "each row of divorce." The doctor concludes with "I never saw a "more barefaced prostitution of any law or religion."

August 30th.—A cool morning succeeded to a rather warm and restless night. The situation of the Chief's residence debarred our enjoying the light airs that blew from the eastward, and the myriads of tormenting sand-flies that shared our otherwise comfortable apartment admitted but

* It must be remembered that the Gurans, as I have before remarked, conform to the usages of the Mahomedans when in the towns, or in the presence of Mahomedan functionaries, and are judged, I believe, in all respects with the same forms as the real followers of the Prophet in the Law Courts; or, which is oftener the case, condemned unheard,—unless, indeed, the rigour of the edict be softened by the administration of a timely bribe.

of little repose. Being anxious to conceal as much as possible the nature of our operations from the natives, Major Rawlinson withdrew, attended by the villagers, to the cool shade of some luxuriant walnut trees, while I occupied myself in taking the necessary observations* for ascertaining the position of the place. This was satisfactorily accomplished without exciting suspicion: and here I may remark, that a too great caution cannot be observed by travellers in this respect when journeying among superstitious Asiatics; for a casual display of a brass instrument, by exciting the cupidity of the lower orders, may tempt them to plunder, and at the same time cause, in the minds of the better classes, a distrust as to the motives of the stranger in visiting so distant a country, which may terminate in the loss of his liberty, or even be attended with serious risk to his life.

A sumptuous breakfast was discussed in company with our host and a Sinjabi Chief. The viands were laid on carpets, spread on a raised platform, built around the trunks and under the umbrageous foliage of a copse composed of the walnut, the willow, and the stately poplar. Numerous artificial ducts convey the clear cold waters of the Zemkan in every direction around us. Uniting at a point about fifty yards beyond where we are seated, they form a cascade, and serve to set in motion a few flour-mills that are now in active operation, and lend their aid to the suppressed murmurs of the torrent below in breaking the otherwise general stillness of the surrounding scene.

Some anxiety is now felt at the non-arrival of Mr. H., who should have joined us this morning from Harunabad by the unfrequented road through the mountains to the south. The state of the country, indeed, causes serious alarm at his protracted absence, and as a further delay here will prevent the execution of our plans, we are compelled to leave in inquietude and uncertainty. At 2·55 P. M., therefore, we resumed our route, after dispatching some horsemen to the south in quest of our friend. Our course now lay along the left bank of the Zemkan, up the valley of the river in a direction of north. At 3·30, the river was forded again, and a general, but rather circuitous, route, was kept of 56°, while ascending the northern slopes of the Kal'eh Kazi range. At 5h. the head of the pass was reached, after traversing a rough road over undulating ridges, bearing a sorry and barren aspect, but here and there re-

* The results of these observations are given elsewhere, under the head Gahwarah.

lieved by small hamlets, surrounded with willows in the vicinity of a winter torrent. The head of the pass is about one and a half miles distant, due north of the high peak called Kal'eh Kazi, and which gives its name to the whole range. From this point the extensive and fertile plain of Mahidasht is seen, covered with the temporary villages and tents of the nomade tribe of Sinjabi. This tribe is a comparatively rich one, if we may judge from the number of the flocks that are seen browsing on the slope of the mountain, and in the plain below. Descending into the plain, we continued a direction of 67°, at a more rapid pace, feeling some relief after our late mountain scramble, at 6·30. The road taking a direction of east, the following bearings were observed: a small fortified mound, probably an ancient tumulus, 20°, distant three miles; a small walled town or village, 56°, seven miles distant; walled villages of Ohargunish, with an ancient tumulus close to it, 125°. At 7·50 the small, but at times impetuous, Mirikh was forded. This now insignificant stream becomes deep and rapid in the winter. It rises in the plain about sixteen miles due south of Mahidasht, and, passing that village, continues a north direction until it meets the Kara-Su in the plain of Kirmanshah. At 8·15, a small village at the foot of the low range of Kamr-zard, bounding the Mahidasht plain to the eastward, became our halting place for the night: a more miserable abode could scarcely be met with by those unaccustomed to wayfaring in the east, than the one we at present occupy. A raised platform of mud, on which the Khan or Chief receives his guests, holds his councils, and dispenses justice, seeming to be the most inviting spot the place afforded, was obligingly given up for our accommodation. This was situated in a small enclosure, which boasted, besides the platform alluded to, of two small mud tenements, in which were secluded from mortal gaze the females of the Khan's family. The area of this den was occupied by mules, cows, sheep, goats, horses, and the other paraphernalia of a moving community; in addition to the goods and passengers of a Persian caravan, which, among other rare and live specimens of the "*genus homo*," bears, in not very carefully sealed coffins, the corrupt remains of departed Shiahs on their way to the holy shrine of the sainted Hussein at Kerbela for interment. The stench arising from the cattle, from these disgusting relics of humanity, and from the accumulation of every species of filth in the interior of the place, was sufficient in itself to render the attainment of sleep a luxury to be desired. The evening meal which our saddle-bags furnished, was hastily dispatched, when report was made of the non-arrival of three of our servants that had preceded us. All was now bustle

and confusion, for no doubt existed as to the cause of their absence in this disturbed district. Horses were re-saddled, and a large number of armed men, headed by the Khan himself, issued forth on the search for the missing party. Sleep was now out of the question, if, indeed, the numerous tormentors which infested our clothing would have otherwise permitted it. In a short time one of the missing servants, a Christian of the name of Sarkies, half dead from excessive fear, rushed in, and commenced a serio-comic harangue by disavowing his own identity, frantically exclaiming, "I am not Sarkies"—"This is not Sarkies that you see," and followed the sentences up with a copious burst of tears. This conduct in a stout, thick-set fellow, armed to the teeth, as he then was, was too ridiculous to be borne, and, moreover, it prevented our obtaining any information as to the disaster. The production of the "Fellek," used in bastinadoing, soon operated as a sedative, and the threatened administration of that wonderful medicine instantly restored his scattered senses. It appears from his account, that, anxious to have a place ready for his master's reception, he was induced to push on ahead of the party, particularly as a fine open plain was then before him. Two other servants followed his example. They had not gone far when dusk set in, and, coming upon a branch road, they stopped at a village near at hand to enquire their way. The artful villagers, ever ready for plunder, purposely misled them, and three individuals, said to belong to a strange tribe, who happened then to be stopping at the village, mounted in pursuit. The party was soon overtaken, and, as a matter of course, abandoned their mules as soon as the horrible yell of the pursuers reached their ears: without waiting to observe the numerical strength of the foe, which in this instance exceeded not that of their own party, and were by no means so well armed, the prudent Sarkies beat an ignominious retreat, and, luckily, in the dark stumbled on the party sent out in search. On being questioned as to why he wore arms, he candidly avowed that a desire of distinction had made him vain enough to equip himself in martial guise, but he had learnt from the experience of this eventful night that the hero became him not, and discreetly enough determined for the future to abjure so perilous a pursuit. He was dismissed after an admonitory caution; and, heaving a long-drawn sigh, congratulatory of his escape from broken bones, he retired crest-fallen to his lair, and no doubt mentally pondering

> "On the dangers that environ
> The man who meddles with cold iron."

The night was passed in hearing the numerous conflicting reports

that hourly arrived, but conveyed no satisfactory intelligence; and while Major Rawlinson gave audience to the incongruous relaters, I endeavoured, but in vain, to obtain the meridian altitudes of Saturn and Jupiter, in order to fix the position. The task, however, was a hopeless one, for the influx and reflux of the mob, coupled with the stamping of the cattle's feet, caused such a tremor on the ground that the mercury in the horizon was perfectly useless.

When morning dawned, nine prisoners that had been brought in from the suspected village during the night were paraded for judgment. They were certainly the most sinister rascals in appearance that the eye ever dwelt on, and their looks alone would be sufficient to condemn them in the mind of a partial judge. Persian-like, they all swore, by God, by Mahomed, and by Ali, that they were utterly ignorant of the affair; and as to having aided, abetted, or connived at, such a flagrant act as the plunder of an Elchi to the Amir of Kirmanshah, Al humd'l Allah, it was too well known that they were peaceful subjects of the Shah, and ryots of the Amir, even to cause suspicion to rest upon them. Two of them, however, notwithstanding their vehement protestations of innocence, were recognized as having misdirected the servants, and were retained in custody. The rest were discharged, much to the chagrin of some of the native officers of the party, who were desirous of keeping them to grace our entry into Kirmanshah, after the prescribed customs as established by precedent, pertaining to all public entries in Persia.

As the morning advanced, another of the absent party made his appearance in an unenviable plight, having not only his clothes much torn but his flesh also. This worthy fellow, animated by the example of the brave Sarkies, had fled on the first alarm, and concealed himself some feet deep in a hedge of briars. His great alarm had overcome the sense of bodily pain that he must have endured while struggling to gain a secure position. This he at last effected, with the loss of his clothes and more of his skin. He was discovered in his "form" in the morning, and could, so great were his fears, scarcely be persuaded to abandon himself to the kind care of his friends, who, in their endeavours to release him from his uncomfortable bed, I am afraid, by the laughter of the relater of the story, inflicted on him a penance suitable to the ardour of his disposition. But "*arma virumque cano.*" The last and only stout fellow of the absentees has just arrived, bruised and wounded, but with a merry heart, alternately laughing at the agility displayed by his fellow servants, and anon cursing their pusillanimity in no measured

phrases. The hero, be it recorded, is the "cuisinier," who, unarmed, saving his redoubtable spit, managed to keep the marauders at bay in hopes that assistance would arrive, knowing that the rest of the cortege could not be far behind. In this he succeeded, inasmuch as he saved his own mule and the property he was charged with. The robbers, fearing the proximity of assistance, were glad enough to decamp with the abandoned mules and their loads, leaving the brave "artisté" in possession of the field. Seeking a secure retreat, he prudently remained until the morning light pointed out the direction of our abode. This man is a Mahomedan, and I have been thus tedious in describing the events that occurred at Kamr-zard in order to shew the "animus" that actuates the different sects both in Persia and Turkey. The ascriber to the national faith possesses at all times an inherent freedom, and comparative independence, which stimulate him to energy, and stamp on him a firmness of character; while the contemned and despised Christian, outcast as he is on his native soil, and in a measure unprotected by the Government, has long since lost all confidence in his own powers of action, and abandoned himself to the current that he could not stem. Patiently, and with seeming meekness, he awaits the favoring eddy that ere long casts him into the reflux of life waters, and thus stealthily creeps up to a precarious proximity with the overweening Mahomedan, and maintains his position in the undefined society of which he is a member. To effect this, however, he is compelled to resort to cringing and obsequiousness, to cunning and deceit,—the degrading, yet predominant, attributes of an oppressed people. This is, however, only applicable to the Christians of the towns. The Nestorian tribes, and the Christians of the Lebanon, still possess a character for independence and courage, and display it too, when the tyrannical hand of their despotic masters obliges them to resort to arms.

August 31st.—Any further delay being deemed useless for the recovery of the lost baggage, we left at 11·25 A. M. Reached the summit of the Kamr-zard range* at 12·5, and observed Kal'eh Kazi to bear from it 254°. Parrow hill at the same time bisected 94°. Descended into the plain of Kirmanshah, and kept in a direction of 112°, occasionally along the base of Kamr-zard undulations. 1·30 P. M., halted in the shade of some trees on the margin of a pretty lake, covered with the

* A low undulating range, bounding the plain of Kirmanshah to the west. The small river *Mirickh* sweeps round the N. W. end of the ridge, and joins the Kara-Su.

beautiful and sacred lotus. It is called Sar-abi-nilu-fir—" the spring of the lotus fountain." We are informed that it is celebrated for the mermaids that wanton in its waters, and much astonishment was expressed at our incredulous looks. They nevertheless assure us, with all the gravity imaginable, that mermaids have not only been seen here, but have actually been combated with. The lake is stated to be fathomless, but this statement we can place as much reliance on as in the tale of the fair mermaids. A spring issuing from the foot of the undulating hills keeps the lake plentifully supplied with water; and close, too, are the remains of some ancient buildings, denoting, in all probability, the former existence of a fire-temple upon this spot.

Our halt here was enlivened by the performance of a man on stilts, who bestrode a hobby horse. He amused us with dancing, throwing the jerid, and singing, in extempore verse, the praises of the Elchi-Bashi from Frangistan, and really displayed much agility in his various feats.

Refreshed with our halt, we re-mounted at 2·30, and crossed a small stream running from the lake, which must be supplied also from copious springs in its bed. Continued the former direction through the plain, which is highly cultivated, and is watered from the Kara-Su. The black tents and encampments of the Zangani Kurds serve as a contrast to the rich verdure of the extensive plain. At 4·30 a party of merchants from Kirmanshah, connected with Baghdad and India, met us about four miles from the town. These worthy people, in paying their respects to the Resident, had prepared in a secluded spot some excellent cool melons, of which we partook, and found very refreshing after the hot ride we had undergone: thanking them for their consideration, the journey was continued. When about two miles from the town, a cloud of dust announced the arrival of an escort of honor sent by the Amir. Our negligent line of march was now restored to order, so as to make as imposing an appearance as the circumstances would admit of; and the indefatigable Rejib failed not to place, in conspicuous array, the captured culprits of the Kamr-zard. Poor Sarkies, now divested of his martial bearing, and shorn of his arms, looked a very Sarkies indeed; and, instead of seeking for new honors in the advance, contented himself with his humble position in the rear. Both parties neared each other, but the dust would scarcely permit our distinguishing the head of the procession. It turned out, however, to be the son of the Amir, with a numerous retinue of mounted officers, and some Sirbaz on foot. On meeting, the young prince in courtesy dismounted to offer the greeting and congratulations

of his father to Major Rawlinson, who received him in the same manner. The compliments ended, we resumed our march for the city, preceded by the escort: the prince, an interesting lad of about twelve years old, riding by the side of the Major, and performing his part in the pageant with a dignity becoming a greybeard. The advance was conducted with the usual display of sham encounters, and a proportionate expenditure of ammunition, and the exhibition of the "pomp and circumstance of glorious war" up to the city gates. Our appearance on entering the town, however, more resembled the arrival of a caravan of flour sacks than the advent of honored guests, for it was even difficult to distinguish the features of the party, so begrimmed had we become from the dust heaped upon us by the varied evolutions of the retinue that preceded us. At sunset we reached the palace of the Amir, and were conducted to the presence, through numerous dark and ill-arranged passages, well adapted for defence in troubled times. The Amir, Mohab Ali Khan, a short but gentlemanlike personage, attended by his brother the Governor of Luristan, welcomed us with dignity and politeness. He is suffering from a musket-ball wound in the arm, received at the siege of Herat, seven years ago. The usual compliments having passed, we were served with tea, kallians, and sweetmeats, in a small, open, but mean, apartment looking into the courtyard of the building. We made but a short stay with his excellency, as we felt fatigued, and were glad to retire to an excellent house that is placed at Major Rawlinson's disposal during our stay here. Our anxiety and alarms on account of Mr. H. were soon dispelled by his appearance, he having come on direct from Harunabad to Kirmanshah, in preference to joining us at Gahwarah. He succeeded in copying a Greek inscription which he found on a broken tombstone at that place, but failed in bringing the tablet away with him, from the jealousy of the natives. I shall have occasion to speak of this stone at a future time, and will now employ the organ in the performance of other duties equally essential to it, for I see a numerous array of the Prince's domestics, bearing on metal trays a profusion of viands, to serve us as an evening meal, amongst which I recognise, by the pyramids of ice floating in them, sundry bowls of delicious sherbets, composed of the lime, the pomegranite, and the grape. This is hospitality, indeed! But, sad reflection, the poor man may be, and in all probability is, suffering from his prince's ostentation!

Two regiments of foot, comprised of Azerbijan Turks, are at present stationed in the town and its neighbourhood. The Amir, too, is a native

of the same province, and the policy of thus quartering foreign troops in a distant province cannot sufficiently be extolled, as it enables the grasping ruler to carry out his oppressive measures on the governed in tolerable security, and, at the same time, with a freedom from annoyance, which might otherwise be experienced from the employment of a sympathising soldiery. The great end and aim of all functionaries in Persia and Turkey is the inordinate possession of wealth; and this ruling passion extends through all grades of individuals, from the prince to the peasant. From the general to the private soldier, all are alike mercenary. An extortionate system is speedily organized for the attainment of their object, and insecurity of property soon results. Being deemed rich is an offence in the eye of the law, and means are quickly found for the transfer of private property into the hands of insatiate authority. The merchant is thus afraid to trade to any extent, and the cultivator will not sow where he cannot reap. Commerce is therefore almost entirely confined to the supply of the necessaries of life. Its luxuries are unknown, except to the despot. The community of the city, and the inhabitants of the province, are loud in their complaints at the present time, and many influential merchants that once resided in this favorite locality for trade, have left the spot for less oppressed regions.

In a former portion of the journal I have shewn the nefarious system adopted for the collection of the revenue, and the usurious means resorted to by the Agents, who are chiefly officers and soldiers of the Azerbijan regiments. They are reputed rich enough even to influence the money transactions of the place.

Kirmanshah, * under the Government of Mahomed Ally Mirza, a few years ago, bore the reputation, and, I believe, justly too, of a thriving city. This prince, unlike his successors, and, indeed, of a different stamp from those who preceded him, by his energy greatly improved the province, and a security almost unknown in Persia soon pervaded the districts under his rule. His ambition, however, led him, like the satraps of old, to covet some part of the fertile steppes contiguous to his mountain territory. He was the eldest son of the Shah of Persia by an inferior mother. He was undoubtedly brave, and in a great measure independent. In 1821, with a considerable force, he succeeded in wresting the Pachalic of Zohab from the Turks, adding the rich plains, as far west as Khanakin, to the dominions of his father. His ambition did not stop here; but, having gained thus much, he conceived a design of marching

* Kirmanshah is in latitude 34° 18′ 45″ N., and East of Baghdad 2° 32′ 56″.

against Baghdad itself. In one or two encounters he defeated the Turkish forces sent out to oppose him, and in a few days would, in all probability, have laid siege to the city, when the cholera appeared with great virulence amongst the troops. He became one of its victims, and died in the neighbourhood of Sherahban. The dreadful malady spread rapidly amongst the panic-stricken troops, who were compelled to retreat into their own territory, to the great relief of their Osmanli opponents. Since the death of that prince, Kirmanshah rapidly declined. Built on the skirt of an extensive and well watered plain, it possesses every facility for becoming a rich and populous city; and its central situation on the main road between the capital of Persia and the once opulent cities of Baghdad and Moosul, increases its local advantages.

To the rapacity of its successive governors, plague, and cholera, those scourges of eastern cities, have lent their pestilential aid in reducing its population, which is formerly given as 35,000, a number exceeding perhaps by two-thirds the present amount. It boasted, too, of some handsome edifices, but these for the most part have gone to decay. The town, indeed, has but a mean appearance, from the approaches to it, and were it not for the lofty turrets that flank the anderun or "women's apartment" of the palace, it would fail to strike the eye. Almost concealed in the uneven ridges of some undulating hills (Kamr-zard) that bound it on the south face, it is reputed hot, and at times unhealthy. The gardens are, however, pretty, and contain some fine fruit trees. The slim and lofty poplar flourishes here in prefection, but is seldom allowed to attain to maturity in the present times. Internally, the town presents a picture of ruin similar to most eastern towns. The "*palace*" walls are surrounded by untenanted hovels, and decay presents itself whichever way the eye of the spectator turns. Its bazaars are but partially filled, and, with the exception of fruits, which are abundant, offer but little proof of commercial enterprize. Kirmanshah was celebrated for the richness and beauty of its carpets, but scarcely one is now obtainable. Industry, indeed, is at present unknown on the spot where thousands of busy fingers were daily occupied in weaving those beautiful and justly famed specimens of Persian workmanship. The causes of this lamentable decline of the trade and the arts have been already specified; it remains only to notice that the better sorts of piece goods and other European manufactures find their way here from Tabriz, and the refuse of the Baghdad markets are also imported by the poorer dealers, when the bazaars of that city are overstocked. Tabriz is, however, the chief place from whence its imports are derived. The town

was formerly girt by a strong wall, that now exposes large gaps through which a squadron of horse might traverse the whole range of its streets, rendering the gates of the city a dead letter, and merely used from habit alone. West of the town stands the Kubristan, or graveyard, containing some well kept and tolerably well constructed tombs, the mausoleums of the holy mustaheds of the place. The Necropolis, indeed, wears an air of cleanliness and order quite foreign to the city of the living, where filth, squalor, and misery, reign supreme. I here first remarked the singular custom of describing on the tombstone the sex and profession of the defunct by various devices, which, in a subsequent age, may excite as great an interest as the hieroglyphics of Egypt. The grave of a female is shewn by a double comb, that of a male by a single one. The trade or calling of the individual is known by some suitable weapon of war, or implement of husbandry. A few of the tombs were also decorated with the braided tresses of a mourning wife, or more probably of some betrothed maiden—affection's tribute to the departed dead. This I afterwards observed in the neighbourhood of Behistan, and Sermaj.* The custom is a remarkable one, and originated no doubt in a very remote age.

* Herodotus, Book IV., Art. 26, alludes to this custom of removing the hair and offering it at the sacrifices among the Issedones. On the death of a parent, and at the festivals termed Τενεσια and Νεμεσια by the Greeks, "they placed locks of hair on the tombs."

The Πλο Ναμοσπεν Θητηριοξ of Aeschylus, as noted in the Greek and Roman antiquities, evidently distinguishes this peculiar observance as a very ancient one. Major Rawlinson in his journey into Khuzistan (Royal Geographical Journal, pages 53 and 58 of Vol. IX. part I.), remarks at some length on the same usages existing among the tribes of Luristan; and from personal observation I can state that it prevails in a more or less degree throughout the Arab tribes from the borders of the Mediterranean to the confines of Persia as far south as the Persian Gulf. On one occasion I was an eye-witness of the deposition of this species of tribute to the dead. In 1842, I had ascended a remarkable mound for the purpose of observing with a theodolite some conspicuous ruins on the banks of the Euphrates. The place was a lonely and quiet spot, on the open desert, and, with the exception of a servant, I thought I was the only human being in the vicinity. I was astonished, however, at hearing the low sobs and plaintive moans of a female, and on looking through my telescope observed, at the distance of about 200 yards from me, a young Arab girl, prostrated on a newly made grave, apparently in the extremity of grief. Had she seen me she would undoubtedly have fled, but her grief absorbed all other reflections, and I crouched under the lee of the mound to watch her painful but interesting task. She repeatedly embraced the cold earth, even laying her lips to the humid soil, and uttering occasionally the most piercing shrieks, at the same time wringing her hands and beating her breast in every attitude of affliction and woe. Violent grief is not of long duration, and her paroxysms soon subsided into a calm despondency. With tears streaming from her fine black eyes, she afterwards proceeded to disengage every braided tress that adorned her head, by means of a sickle hook which is used in these parts to cut grass for the cattle, and then,

Though the town of Kirmanshah possesses in itself scarcely a single feature of interest, the neighbourhood must be viewed as a locality abounding in antiquarian riches. The extensive plain on which it is situated, joining that of Mahidasht to the west, extends also some distance to the east beyond the storied rock of Behistan. To the north, the bold and serrated crags of a spur from the great Shahu range, surmounted by the Peak of Parrow, confine its breadth to a distance of about six miles, while its length may be reckoned as exceeding thirty. The waters of the Kara-su, flowing from the N. W., are met by those of the Gamasab, derived from a N. Ely. source, a few miles S. E. of the town. These form the main source of the Kerkha (Choaspes). Over this vast plain is scattered the remnants of antique edifices, whose very names are lost in obscurity. Headless columns and baseless capitals, of an unknown and unique order, border the main road, which passes through the plain. These serve to attract and excite the attention of the traveller, who is soon rewarded for his past toils by the sight of monuments of a more absorbing interest. I allude to the Taki-Bostan sculptures, and the engraved tablets of Darius at Behistan. The latter, the most elaborate and extensive in Persia, in connection with the cuneiform

binding them carefully to a stick that she had brought for the purpose, she forced it with her timy hands as far as her strength would permit, into the earth, at the head of the grave. Silently, and with measured steps, she then took the road for the tents of her tribe, which must have been at a considerable distance, for I watched her form upon the desert with my glass as long as she remained in view. It was a sight I shall scarcely forget—a lone girl in sad converse with the "sweet dead," on the trackless desert, canopied by the clear blue sky, occasioned reflections prejudicial to the pomps and unseemly ceremories attending the obsequies of the dead in our civilized Europe.

In Leviticus, Chap. XIX., verse 27, "the corners of the head" is thought by some to refer to this practice of cutting off the hair: the above rendering, as given in the English Bible, signifies in Hebrew "cutting off of the extremities of the hair." It was in practice among the Gentiles when mourning for the dead, and is condemned as an abomination. See remarks on Leviticus appended to the Analytical Bible. The representation of a horse's head, occasionally met with on the grave-stones in this part of Persia, would refer us for its origin to a very early period. The ancient Greeks used it as a funeral emblem, and signified "death is but a journey." See Greek and Roman antiquities, under the head "Funus."

The funeral processions in Turkey and Persia are still attended by hired mourners. This is probably a vestige also of ancient Greek usages. These Ἐργωδοι of antiquity excel the really bereaved relations and friends of the deceased in their wailing and lamentations.

While on the subject of funereal observances, I may as well state that when employed on the Upper Euphrates, the sacrilegious hands of my companions exhumed, from a very ancient sepulchre, contiguous to the old fortress of Halebi, the mummied remains of its long-buried occupant: one hand and a foot, with the leg-bone, were entire, and I think, from their diminutiveness, must have been those of

inscriptions of Persepolis, of Hamadan, and of Van, have already awakened the intellectual repose of enlightened orientalists, and will shortly incite, through the talents and acumen of my fellow traveller, an additional interest over the whole of the European world. This locality, indeed, though comprising but a comparatively small portion of the large expanse now open to research, offers in itself many powerful stimuli to engage the active mind of the antiquarian and geographer.

Our stay at Kirmanshah was felt as a seasonable relief after the fatigues of the late journey, and while Major Rawlinson's time was devoted to official pursuits, mine was sufficiently occupied in the prosecution of the duties of the surveyor. Our little chronometer, indeed, required all my care, for it now begins to be sensibly affected by the change of temperature, and the perturbations that it had sustained during the last few days of mountain travelling. This, however, is of no consequence, as we are compelled to remain in this vicinity until communications be received from Teheran. In the interval, a new rate will be obtained, and a visit to Behistan, and return to this place again, will afford a triple test of its performances. The detail of the journey hitherto has been daily added

a woman—and moreover a woman of rank, for the face had been originally covered with a gold mask. The upper part of the tomb was very ruinous, and this may account for the other parts of the body having mouldered away. It was built of brick, with a cupola-shaped roof. A part of a coffin, elaborately painted, but too much disfigured to distinguish any device, with some shreds of apparel, were obtained, in addition to the mask of gold. This latter was of the purest metal, pliable, and as clean as on the day it was first devoted to the service of the dead. It was impressed with the features of the deceased, and weighed, if I remember right, about forty ghaze,—a gold sum equivalent to 8£ sterling, but its real value, from its purity, may have been about one-fourth more. I cannot find any notice of this custom as pertaining to the burial rites of any of the nations of antiquity, and accordingly presume that it may have represented, or was substituted for, the Δανακη of the Greeks, and destined as a votive offering for the guardians of the Acheron and Styx. It is now, I believe, in the possession of the East India Company. The body had evidently undergone the usual preparations previous to interment, which the ancient authors describe as in vogue among the Egyptians. The nails and cuticle of the extremities were perfect, and a bituminous substance was observed on fragments of the swathing: its peculiar odour was also manifest. On opening the tomb, three other sepulchres of similar construction stood at a short distance from the spot on which this monument is erected. Time, or the desecrating hand of the Arab, had already despoiled these previous to our visit. The natives, however, informed us that a jewelled dagger was found on a body excavated from one of them a few years ago. The spot is one of much interest as connected with Tadmor or Palmyra. The construction of the fortresses of Halebi and Zelibi (their present names) has been assigned to the Palmyrean Queen Zenobia, who, after her defeat by Aurelian, is represented to have fled to this spot, and to have been captured while crossing the Euphrates.

These fortresses, erected on either hand of the Euphrates, command the gorge through which the river forces itself in its descent to the alluvial plains of Baby-

to the map while fresh in the memory, and it is satisfactory to state that the minutiæ of the Road-book has in the aggregate been corroborated by our astronomical observations.

Sept. 4th.—The ladders for the ascent of the Behistan cliffs being ready, we left Kirmanshah at 5·5 A. M., on a delightfully cool morning. Proceeded due east, or 90°, until 6·5, when the Kara-Su was crossed by a substantial bridge called Puli Shah. Continued in the same direction over a fine plain having the Parrow range of hills at a distance of four miles to the left of the road. Passed by several villages of cultivators, and exchanged greetings with some caravans of pilgrims en route from the capital to Baghdad and Kerbela. At 9h. A. M. the road inclined a little more northerly towards the hills over the site of some ancient buildings whose alignments can now scarcely be traced; but the numerous fragments of columns, cut stones, pedestals, and capitals of a Sassanian design, attest it as a ruin of that age.

From 9·45 to 10·15, the road turned to the north in a gradual curve as we rounded the termination of the Parrow range, known by the appellation of the "Rock of Behistan." At the latter time the Caravan-

lonia, and constitute a very strong position. The elevation of the citadel of Halebi is 316 feet above the river. It is in latitude 35° 42′ N., and lies in the direct road between Palmyra and Nisibir, and in times long prior to the Zenobian Era may even have held a more conspicuous place, as a central entrepôt between the port of Tyre and the N. E. Provinces of Assyria.

I had just finished the above note, when a letter was placed in my hands by an inhabitant of Anah, a small town on the Euphrates. A portion of it is applicable to the above subject, and as I have never heard of a similar exhumation, during my service in these countries, I venture to transcribe the extract rendered into English:—"Some workmen were lately digging under a part of the old castle at Anah, and in the course of their labors they disinterred an old box, or coffin. It was found to contain a smaller case, which on being opened exposed the remains of some wild or rare bird, swathed up in linen."

This rare bird, we may therefore presume, is a vestige of Egyptian adoration; either the eagle, ibis, or a hawk, and will, I think, tend to shew that Anah was the abode of an Egyptian colony. The sacred birds and animals of the Egyptians were regarded with peculiar awe, and the rites and ceremonies observed on their death partook of a religious character: their bodies were embalmed and enclosed in consecrated coffins. See Herodotus, Book II., Diod. Sic. I., Chap. 6 and 7.

The many substantial works met with in the bed of the Euphrates and on the Islands contiguous to the present town of Anah, would claim them to be regarded as the relics of a remote age. But for the etymology of the present name we must, I think, refer to the Greek Ἀγαθὸν, which I deem strictly applicable to the locality from the many rapids formed by a number of rocky islands, and numerous artificial obstructions, occasioning at all times an impetuous and roaring torrent. To the Romans it was known by the name of Anathe.

serai, or Khan* of the same name, received us as its tenants for some days to come. Its murky vaults, redolent of every effluvium, smoke-begrimed and covered with pendant bats, afford a striking contrast to the marble hall and fountained apartment of our abode of yesterday: and yet, after all, this is the life that charms. The real traveller, indeed, knows neither inconvenience nor discomfort; he sits down to his scanty fare of an onion, cheese, and pure water, with more zest than awaits the epicure at a sumptuous repast. So long as he keeps his health,—which is certain unless in a very noxious climate,—he suffers neither indigestion or ennui, and enjoys that quiet sleep which is only experienced after a day of active exercise both of the mind and body.†

The afternoon of this day was devoted to cleaning the sculptures and inscriptions preparatory to Major Rawlinson's revising his former labors. The ladders had been carefully fixed, and the requisite ropes for assisting the ascent up the steep face of the lower portion of the scarp properly adjusted, beforehand. In about a quarter of an hour, not without sundry scratches and bruises, the platform at the base of the tablet was gained, and operations commenced accordingly. From this time until the 11th of the month we remained in this vicinity. The Major constantly and indefatigably employed himself, from daylight to dark, revising, restoring, and adding to, his former materials. This was a work of great irksomeness and labor in the confined space he was compelled to stand in, with his body in close proximity to the heated rock and under a broiling September sun. A series of astronomical observations were daily made in the forenoons, and the afternoons were devoted to sketching the various objects of interest in the locality, and in taking the dimensions of the magnificent rock before us. To continue the journal, then, during the period of our stay here, would be both uninteresting and tedious. I will therefore attempt to describe the relics of antiquity that have of late so much occupied the attention of the Orientalist and Palœographer (Maj. Rawlinson, in his Notes on a March into Khuzistan, published in the Journal of the Royal Geographical Society, has sufficiently established the identity of this place with the Baghistan of Diodorus

* The Khan of Behistan stands in latitude 34° 22′ 35″ N., and is 2° 55′ 38″ E. of Baghdad. The variation of the Needle in 1844, was 3° 44′ west.

† The incidents and danger at times attending the traveller in the East, coupled with the chase of the grisly boar or the timid hare,—a stray shot at the numerous wild fowl that infest the streams, or at partridge, which abound on the mountain slopes,—lend excitement to the otherwise tedious duration of the day's journey.

Siculus,* and with the various appellations it has been subsequently known by. No one who has ever visited the spot could fail, indeed, to recognize it after reading the accurate description of that author in his history of the march of Semiramis from Babylon to Ecbatana. D'Anville, I believe, was the first to assign a position to it on our maps,† and Major Rawlinson has since corroborated, by etymological evidence, almost every site in the adjacent district, whose nomenclatures had either been partially corrupted, or entirely lost, in the lapse of ages.

Many travellers of various nations have contemplated, with a wistful gaze, these elevated petral records of a prior age, from the plain below, but few have had the energy to ascend for a closer scrutiny. Many surmises as to the nature and character of the work have at successive times appeared from the pen of different individuals,‡ but the best representation is by the late Sir Robert Ker Porter, who, as a faithful artist, gives, with few immaterial exceptions, a very correct delineation of the sculplured group. His ingenious but conjectural ideas in illustration of the design, have, however, of late been overthrown by unwearied application and research; and the results of this close study, improved, digested, and matured, by the present visit, will, embodied in a work, ere long be confided to the discernment of the public, by its talented author.

* Book II, Chap. I. It is somewhat remarkable that in this notice, as well as in a subsequent one, (Book XVII. Chap. XI.,) of Bagistan, Diodorus should make no mention of these inscriptions of Darius, while he dwells with a minuteness of detail on the local features of the country, its pleasure gardens, fountains, and palaces. Arrian, too, in his compiled history of Alexander, passes by this celebrated spot with a mortifying description of the Nysean pastures only: and Herodotus, so generally minute in his geographical and historical details, himself a traveller and recorder of the deeds of most of the monarchs of Media and Persia, has on this subject maintained a profound silence,—at a time, too, when the work was comparatively recent.

† D'Anville, Book II. Chap. 5, calls it Bagistana. Its other appellations were Baptan, Bisitun, Be-Situn, Bostan, and Bapatan; the first and last, according to Major Rawlinson, evidently applying to the whole district of Ecbatana. Behistan is now given, by the latter authority, as its proper orthography.

‡ The quaint old Tavernier, in Book III. Chap. 5 of his travels, evidently alludes to these sculptures. He says—"Between Sahanak (Sehaak) and Polisha (Puli-Shah) you have the only high mountain in all the road to the north. It is steep, and straight as a wall; and as high as you can see, you may observe the figures of men clad like priests, with censors in their hands, and yet, neither can the natives tell you, nor any person imagine, the meaning of those sculptures. At the foot of the rock runs a river, over which there is a bridge of stone." Tavernier travelled in Persia in 1663, and is probably the first European that notices this interesting design. Later travellers, in the exuberance of their fancies, have discovered in the figures a likeness to the twelve Apostles.

The arid and bare range of Parrow, bounding the Kirmanshah plain to the north, terminates abruptly at Behistan, about twenty-two miles east of that city. To the east is the extensive and fertile plain of Chambatan, with the winding stream of Gamasab, pursuing a S. S. W. course through it into the regions of Luristan. Out of this plain the rock of Behistan rises precipitously to an apparent height of 2,000 feet,* exhibiting a bold outline of naked crags, unrelieved by a single trace of vegetation. The scene, therefore, at present is sufficiently striking; and in bygone times, when the rich plains were carpeted with a sea of waving foliage, intermingled here and there with the summer retreats of the Median nobles, with the stately palaces and sparkling fountains of the Babylonian Queen, or with the more recent edifices of Sassanian dynasties, must have worn an aspect of impressive grandeur. Bordering the road that led to the royal cities on either hand, it could not fail to attract the attention of the many proud monarchs that have encamped with their armies in the adjacent plains. We learn from scripture,† as well as from profane history, the fondness of the early Persian Kings for cursive records, whereon were inscribed, not only the acts and glories of the reign, but even the imperial sayings of adulated Majesty. That this custom was prevalent at the Court of Darius Hystaspes, we can hardly doubt, and moreover may infer that this monarch, from the great event that transpired during his dominion, possessed an ardent but excusable desire for a more posthumous celebrity. He must have foreseen that the frail texture of the Διωθεραι Βασιλικαι ‡ was ill calculated to perpetuate his character and achievements, and must, therefore, have determined on the execution of a more durable work, which should convey to his successors, and to the nation at large, not only his pedigree, his conquests, and his virtues, but, by his injunctions and precepts, remind them of the former glory of their ancestors, and the necessity of a strict adherence to the national faith.

For the observation of all, a more appropriate spot could scarcely have

* Mount Bagistan is described by Diodorus Siculus, (Book II., Chap. I.,) as dedicated to Jupiter. He gives its height as seventeen furlongs, by which I presume is meant the distance to its summit by the road. Major Rawlinson has since ascertained its real height by trigonometrical measurements as 3807 feet above the plain. It certainly appears of less elevation.

† The books of Esther, Ezra, and Nehemiah, teem with references to the Chronicles of the Persian Kings; and Herodotus, Diodorus Siculus, and Chesias, frequently mention them. The latter lived a long time at the Persian court, and had no doubt frequent opportunities of witnessing this partiality for recording.

‡ Ctesias. They were made of leather or parchment.

been selected than the Rock of Behistan, where this petral record now exists, in the same state, and in almost the same degree of perfection, as when first executed. About 300 feet above the debris, at the foot of the mountain, and overlooking the plain, the face of the rock has been chiselled so as to expose a smooth surface for the reception of the work. This surface may be divided into four tablets. The main one, devoted to the sculptures illustrative of the writing beneath them, is the largest, and is thirty feet in length and twenty-six feet high. Of this the sculptured slab, with a pedestal of eleven inches, occupies fourteen feet; the remaining portion being dedicated to the reception of the archaic legend, written on four columns in the Persepolitan cuneiform character. Each of these columns, containing ninety-six lines, are six feet and four inches in breadth; and a supplementary half column, now much defaced, appears to have been subsequently appended. Immediately to the left of these, as they are viewed, a projecting slab, twenty-one feet in length, exhibits in three columns a transcript in the more elaborate Median tongue. Their height is the same, but in breadth they exceed by six inches the dimensions of the Persepolitan columns. Immediately above the Median tablet,—with its base, indeed, resting on and slightly projecting over it,—is a semi-isolated rock, inclining inwards towards the hill. This has been scarped on its face and sides, and bears a legend in the still more complicated Babylonian cuneiform,—in all probability a translation in that language of the original text. To the right of the main tablet the hill has also been smoothened for a further space of six feet, and is covered with characters, but so much destroyed, either by time or the action of water, that it is even difficult to distinguish the nature of the character. I am induced to believe, however, that this portion of the work may be either a record of a subsequent age, or that the same pains had not been taken for the preservation of it as was bestowed on Persepolitan and Median designs. In the latter the rock bears evidence of a careful preparation, and has undergone the process of varnishing* before the

* The art of varnishing and painting on walls, and preparing slabs for the reception of designs, was well known to the ancients. Vitrivius and Pliny (see Greek and Roman Antiquities) describe the manner of preparing these slabs, and I have no doubt the Behistan scarp underwent the same process. They first covered the wall with a layer of ordinary plaster, over which, when dry, were successively added three other layers of a finer quality, mixed with sand. On this again three more layers, made of a composition of chalk and marble-dust, were laid, each succeeding coat being of a finer quality than the preceding. They excelled, too, in the art of painting, and encaustic varnishing; and to this may be attributed the fine preservation of the Tak-i-Bostan sculptures, (which bear at this time a very high polish,) and the paintings met with on the walls of Herculaneum and Pompeii, on the rock-tombs of the Libyan Cyrene, and on the recent discoveries made by M.

engraver commenced his labors. This varnish is composed of a hard, flinty, and very durable, substance, and, where not destroyed by the constant trituration of rain-water finding its way down from the heights above, is as perfect and smooth as the day it was laid on. The natural rock, indeed, is not difficult to cut, but the prepared portion resisted a steel chisel that we brought with us, with which we could only succeed in chipping the surface. The great depth, and well-defined outline, of the letters, exhibit considerable skill on the part of the engraver. They are one and a quarter inch in length.

The sculptures comprise a group of fourteen figures, and are no doubt intended to elucidate the text below them. If we except the central and more elevated figure, which may represent the supreme Ormazd, and those of Darius and his two attendants, to the left of the design, we may pronounce the rest of the group as deficient in artistical beauty, and, indeed, show but a hieratic style.* Their forms are diminutive, stiff, and ill-defined; and their habiliments, though well marked, betray no elegance of drapery whatever: the limbs are coarse and misshapen, and their countenances devoid either of animation or expression. Nine of these figures are standing, and are attached to each other by a long-cord passing around their necks. Their hands are bound behind them. The badness of design, and dwarflike forms, in this portion of the sculptures, I presume, is intentional, to denote the inferior and degrading position of the captives,—the metamorphosis serving to convey to the minds of the ignorant and uninitiated the more exalted position and greater virtues of the conqueror, who is represented by a commanding stature, in the attitude of a victor, with his left foot on the body of a prostrate foe, the tenth of the captive group. The form of the

Botta at Khorsabad. For the antiquity of wall-painting we must refer to Ezekiel, who wrote some 600 years before Christ; and it is not a little singular that his words should be verified at the present day by the exhumation of Assyrian relics, and the opening of Assyrian temples. In Chap. XXIII., v. 14, he describes these paintings:—"Men pourtrayed upon the wall, the images of the Chaldeans pourtrayed with vermilion, girded with girdles upon their loins, exceeding in dyed attire upon their heads, all of them princes to look to, after the manner of the Babylonians of Chaldea, the land of their nativity."

Sir Humphrey Davy analysed some of the "frit" [illegible] ancient walls, describes it as a composition resembling stone, a specie[illegible] of "lapis la[illegible] the coloring matter of which is inherent in a hard silice[illegible]

See Greek and Roman Antiquitie[illegible] Colors and Pa[illegible]

* The earliest sculptures and ca[illegible] d figures represented the deities and o[illegible]

Great Darius is portrayed by a superior execution. His features are well developed, and exhibit that energy and determination of character for which he was celebrated. A degree of finish and study pervade the figure of the monarch, who is singularly enough represented with bare feet, while his captives and followers are either sandal-clad or wear a coarse species of shoes. His head, surmounted by the diadem, displays, after the fashion of the day, a carefully-curled mop of bushy hair, extending nearly to the shoulders. The upper lip, too, is adorned with an elegant moustache, and the beard, fantastically disposed in stiff and separately curved tresses, adds much to the dignity of his appearance. The left hand grasps the bow, the symbol of regal power; while the right is elevated and extended towards the prisoners, in the attitude of angry expostulation. The wrists are adorned with bracelets, and a girdle or zone, terminating in two tassels, encircles the waist of the monarch, and serves to bind the flowing tunic that he is habited in. A loose vest or jacket, with large open sleeves, completes his attire. The attendant guards, in their dress, differ but little from the monarch. They have sandals on their feet, and the head is covered with a circular cap only. The one nearest to majesty also bears the regal bow, and a well-stocked quiver hangs pendant at his back. The farthest removed from the king differs from the last only in being armed with a spear, which is held upright by both hands in front, the shaft resting on the ground.

The ærial figure which hovers over the centre of the group would seem to represent the Supreme Being; and this idea is in a measure confirmed by its also presiding over the sculptured monuments of antiquity met with at Persepolis. As the old Persian records always contained an invocation to the deity, so it would appear that their statuary tablets likewise required to be hallowed by the introduction of the Omniscient Creator. Some writers have imagined that the figure merely denoted the spirit of a departed monarch, and was symbolical of the immaterial substance of man. Others have denominated it the "Ferooher"* of the Zend-Avesta: the soul or spirit that presided over all the royal acts —a constant guardian over the regal head: an emblem of the favouritism of Ormazd—a type of the anointed of the Lord.

From its elevated and exact central position on the slab at Behistan, I think, however, we may conclude it to be the effigy of the Creator himself.

* Heeren's Researches. Vol. I., pages 205-206.

It is a half-length figure, clothed with the short vest similar to that of the king, from which depends a long flowing and plaited robe, spread out fan-wise at its skirts; a zone or girdle, terminating in snake-like ends on either side, confines this at the waist. It is probably the sacred fillet still worn by all ranks of existing Gabres in Persia, and by the Parsees on the shores of Western India. The priests of the latter wear also a plaited robe in some respects similar to that described above: a circular ring encompasses the figure in the form of a halo; this has two arms, one on either side, which may represent wings, and would seem figuratively to imply the world and its omnipresent founder.

In the left hand is grasped a circle, the symbol either of eternity or dominion; while the right, with the arm bent and fingers extended, points upwards, and perhaps thus typically expresses a future state of existence.

The features of this interesting figure are, however, sadly mutilated, and can scarcely be recognized, nor can the head-dress that it wore be described. The prostrate figure at the feet of the king, and the first of the erect captives, are in the same deplorable condition. Enough, however, remains of the first standing figure to denote a difference of dress from the rest of the captives behind him. He is habited in the long robe, probably of the priesthood, which extends to his ankles. The next has a shorter robe, reaching only to the knees. The third has a similar short tunic, and the fourth a longer garment extending to the calf of the leg. Each alternate figure then to the end of the string is clothed in the dress of the second preceding him; the last being distinguished only by a high conical cap, similar to that worn by the Persians of the present day. This last figure appears to have been subsequently added to the group, and is carved somewhat deeper into the rock, in a recess appropriated for the purpose.

Scattered about on the face of the sculptured slab, but generally above the head of the figures to whom they apply, are legends commemorative of their names and pedigrees, the names of the province which they misgoverned, or the satrapies over which they misruled. These are also in the Persepolitan cuneiform, with their Medic equivalents. The third standing figure is, however, an exception to the rule, for his descriptive legend is inscribed on the skirt of his garment, and partly on the rock adjoining him. The Babylonian correspondents to these several legends

are engraved on the pedestal which the sculptures occupy, thus forming one great whole, which for elaborateness of conception, and skill in design, is scarcely surpassed, or even equalled, by any single work of art in all Persia, for it contains, in addition to the sculptures, nearly 1000 lines of complicated writing.

Both Herodotus and Diodorus Siculus maintain that the Egyptians possessed two forms of writing, and other authors add to them a third* form. These are classed as the epistolatory, the sacerdotal, and the hieroglyphic. The latter, we are aware, was used as a lapidary character, and in this respect we may assimilate to it the cuneated letters of the Babylonians, Assyrians, and Persians. The very form, indeed, would cause this species of writing to be adopted by the early engravers as the most easy and simple, and in this respect the primitive printers of England followed in their wake, for the angular form of the old English letters was the best adopted either for the speedy formation of types or for the trade of the stone-cutter; and as subsequent improvement in the arts, combining greater skill and dexterity of hand, enabled the moderns to employ the more elegant Roman, or the still more graceful Italic, characters for the purposes of their vocation, so it may have been with the ancient races of Babylonia, and Media, who, on the adoption of a new style, may have lost imperceptibly all traces of the old.† It is hardly possible to suppose, from its formation, that the cuneiform could have been used in a cursive form in the numerous archives of the Persian Kingdom, and we may, therefore, presume, that the courtly documents styled by Ctesias Αἱ φσεραὶ Βασιλικαὶ were written in a character more suitable to an amanuensis, and answering to that employed on the epistolatory correspondence of Egypt.

Be this as it may, however, a few months will disclose the at present hidden meaning of this extensive legend; and the ray that has just dawned on literature at Behistan may yet illumine the dark and mysterious

* See note by Larcher, in the English Translation of Herodotus, Enterpe 36.

† Within the last twenty years the old English writing has been in a great measure abolished in school exercises, for more useful attainments, and now, I believe, is seldom used, except to grace a deed of settlement, a tomb-stone, or a power of attorney. Were England overrun with successive revolutions such as once shook the once mighty empires of the East, in which the sword, for centuries, took the place of the pen, and in which all cursive records were either destroyed or perished in the ruins of the public edifices, it is not improbable indeed, that the traces of this, our primitive character, would, like the cuneiform, be found only on our lapidary tablets, that even now require an "Old Mortality" to restore them.

pall that enshrouds the early history of the world. The excavated relics from the Assyrian cities of Khorsabad and Nimroud are already beginning to unfold to the master mind that wrought out the purport of these fragments of Darius Hystaspes, a narrative of events connected with that æra; and the extensive plains of Babylonia and Susiana yet contain entombed in their numerous mounds a vast heap of archaic legends that would further enrich the materials of the historian.

The portion of these demi-reliefs of Darius that partakes not of the hieratic style of sculpture, may be considered as a good specimen of the age in which he lived. The art at that time in Greece * began to assume a degree of perfection that had been but partially developed in the previous century, and which had been kept back by a too strict adherence to conventional forms. As we possess no information relative to the advancement of this art among the Medes and Persians, we must naturally ascribe the execution of the sculptured group to the ingenuity of the Grecian artists that may have been either captured in war or have been in search of iconic employment in the adjacent territories.

The forms of Darius and his attendant guards display, indeed, an artistic merit that is wanting in the more massive sculptures of Nimroud and Khorsabad, but are deficient in grace and execution when compared with the bas-reliefs composing the zoological tableaux met with on the walls of the Tak-i-Bostan. A peculiar care has been evidently exercised in the performance of the whole work, for where the rock has exhibited fissures or decay, a piece has been ingeniously substituted. In the figure of the king, one of these pieces is observed as morticed into the right shoulder; and in the body of the last of his attendants a similar piece has been abstracted, leaving the lead, wherewith it was clamped, still attached to the bottom and sides of the vacuity. A sacrilegious desire to ascertain if any coins existed in the person of the monarch induced me to attempt the removal of the piece inserted in the shoulder. I had reached the summit of two ladders, which were lashed together, and planted nearly perpendicular against the face of the rock, and was busily employed with the hammer and chisel on my desecrating task. Both hands were thus occupied. An unfair blow delivered in my awkward position, caused the chisel to slip, and another instant would have consigned me to the depths below had I not fortunately grasped the full

* Smith's Greek and Roman Antiquities. See Statuary of II. Period, between 50th and 70th Olympiads, 580 to 450 B. C.

bushy wig of the injured king: even as it was, a sickness assailed me that left but little strength to descend to the platform. The thoughts of my narrow escape prevented for some time a return to equanimity; I then vowed, however, to refrain in future from such iconoclastic tendencies.

This work of Art is situated about a quarter of a mile north of the Caravanserai of Behistan: a shoulder of the mountain here projects to the eastward, forming nearly a right angle with the scarp on which the work is inscribed. This projecting crag shelters the design, in some measure, from the violent N. E. winds and rain that are said to prevail from that quarter; to this, to its elevated site, and to its being left in shade after 2 P. M., I attribute its excellent preservation. Without the aid of ropes and ladders it would be a matter of serious difficulty to reach the spot, and even with these aids no weak-headed or nervous person should attempt the ascent. Above the inscription the mountain bears the same precipitous character to its summit. The wild goat is occasionally seen, with a precarious footing, carefully sauntering along its crags; and the mountaineer, by laying in wait on paths known only to himself, sometimes succeeds in securing a victim.

At the base of the mountain, on the projecting angle before alluded to, and close to a copious spring* which issues from the hill, and irrigates a part of the neighbouring plain, once stood a colossal group of figures executed in alto-relievo. They are, however, so much mutilated by the despoiler Time, or by the desecrating Arab, that nothing but a faint outline is now distinguishable. The centre of the tablet has even been barbarously cut away, to expose a smooth surface for the reception of an Arabic inscription celebrating the virtues and liberality of one Sheikh Ali Khan, the founder of the caravanserai† of Behistan. The tablet bears, too, a Greek record, of which but a few unconnected words are now traceable. The name of ΓΩΤΑΡΣΗC is however distinct enough, and Major Rawlinson recognizes other words which are given in his Notes on a March into Khuzistan.‡ It would be difficult to pronounce on the

* Diodorus Siculus, Book II., Chap. I., notices this Spring:—"Semiramis marched with a great army into Media and encamped near a mountain called Bagistan: there she made a garden, twelve furlongs in compass. It was in a plain champaign country, and had a great fountain in it, which watered the whole garden."

† The erection of these edifices, for the accommodation of the traveller, and reception of merchandise, can be traced to a very remote antiquity. Herodotus styles them Καταλυσεῖς, and Mahomed in the Koran recommends the establishment of them as a pious work. See Heeren, Vol. I., page 31.

‡ Journal Royal Geographical Society, Vol. IX, Part I., p. 114.

nature of this sculpture, from the deplorable state it is now in. It is probably a relic of the times of the Parthian Gotarzes, and from the superior elegance of the forms of the figures, whose contour is just traceable in the colossal group, I am inclined to assign its execution to a more recent date than those of Darius Hystaspes. Its prominent situation, and easiness of approach, will sufficiently account for its effaced appearance, without attributing to it a greater antiquity. It may, however, if we make a due allowance for oriental hyperbole, mark the position on which Semiramis caused herself and a hundred of her guards to be represented;* but to this representation, if it really existed, I think we must appoint a contiguous site, which I will presently mention.

On the debris of the mountain, about 300 yards farther to the north, a singular isolated stone, of a triangular shape, was discovered ; this I believe has before been noticed. It bears, carved on its sides, in basso-relievo, a rough but-well defined design of three figures a little under the natural size. The principal bas-relief exposes a front view of a clumsy human form, with the right arm extended, the hand grasping a globe or ball,† resting on the summit of an " incus" shaped block. The left arm is supported close to the body, and bears in the hand a cup-shaped utensil, probably representing the " Patera" of the sacrifices, or the " Havan" of the Zend-Avesta, and the firstnamed may, therefore, denote the "Ara" of the Zoroastrian doctrines; a second figure on the face of the stone nearest the mountain, represents a foot-soldier, in the act of advancing with a bow in his hand, executed in the same clumsy style; the third is so much worn by time that no peculiarity is distinguishable.

This stone, on the whole, is a venerable vestige of a former age: any attempt to assign a date to it would, however, be but an idle speculation.

Immediately above the khan of Behistan, and about a quarter of a mile separated from the tablets of Darius, a work of greater magnitude than any of those described has evidently been designed. The face of the hill, for 200 feet in length and about sixty in height, has been scarped to some depth, and retains at the present day a freshness of

* Diodorus Siculus, Book II., Chap. I., states—" She cut out a piece of the lower part of the rock, and caused her own image to be carved upon it, and a hundred of her guards, that were lanceteers, standing round about her."

The tablet under reference could not have contained above seven figures.

† Perhaps symbolical of Mithra.

appearance ill according with the time that has elapsed since the days of Khusru Parviz.* This is attributable, however, to its sheltered position. Major Rawlinson supposes the excavated scarp was intended to receive, or to form, the back wall of a temple or palace; and the numerous aligned slabs, of a massive character, that lie in disordered array on the slope at the foot of the hill, would confirm the supposition, and at the same time mark it as an unfinished structure that, from some cause, had met with interruption a short time after the design was commenced. The façade of the building was to have been approached from the plain by a terraced-way built on the debris at the base of the mountain, and a few well-executed capitals at the back of the Khan, of an oriental order, attest it as a work of a Sassanian age. These capitals have carved on two of their sides the figures of a male and female, whose heads are surrounded by a halo-like ring, and may represent Khusru Parviz and his beautiful Shirin. The other sides bear, in graceful foliation, the elegant-shaped design of a "thyrsus," and are wrought in a coarse species of marble. In many parts, however, of the more recent work, we can trace, by its blackened and worn appearance, the chisel of an anterior period; and it is to this circumstance, and to the visible remains of the Φαλλοι' † that lie extended in broken fragments in front of the scarp, we may identify it not only as the spot on which Semiramis established the worship of the fructifying principle as instituted by Isis, but as the actual site of the tablet on which she caused her own likeness, and those of a hundred of her guards,‡ to be portrayed by the statuary. In the time of the Isidore of Charax, the remains of a magnificent palace,§ probably a memorial of the visit of the Babylonian Queen, still existed;

* Royal Geographical Journal, Vol. IX., Part I., 1839.

† Diodorus Siculus, Book IV. Chap. 1, described the divine honors that Isis caused to be paid to the unfound portion of Osiris's mutilated remains after his massacre by the Titans. The Greeks afterwards imitated the Egyptians in this form of worship, and perhaps excelled them in the debaucheries prescribed for the Φαλλικ entertainments; and at the present time, on the Huli festivals of the Hindoos, instead of the dregs of wine, a more filthy composition is bespattered over the persons and dress of those celebrating the orgies, and even on those unconnected with this singular creed.

The Greek Φαλλος and Latin *Phallus* appear to be cognotes of the Arabic فعل Fahl, signifying either "vir," "virītis," or "virilitas," and equivalent to the generative Lingam of the Hindie mythology.

‡ Diod. Sic., Book II. Chap. 1.

§ Note from Isidore, Major Rawlinson's Journal, R. G. Soc., Vol. IX., page 112.

but had been converted into a temple dedicated to Anaitis,*—a temple in all respects appropriate, with the emblems of fecundity around. We may presume, that, on the spread of the Zoroastrian doctrines, this temple was either destroyed or fell into decay; but that the representatives of the lost member of Osiris remained entire until a much later period, we have evidence of in a work of a comparatively late oriental writer.† They are, indeed, at present on the spot; and on a minute examination which we made, the pedestals, and superior parts of the columns corresponding to them, could be distinctly traced.‡ Some of them are of considerable magnitude, and not only indisputably, I think, identify the Bagistan of Diodorus Siculus with the modern Behistan, but at the same time serve to verify the descriptive evidences of Isidore and of Zakariya Kazvini. There can be but little doubt, too, of the foundation of the temple of Anaitis having served for the base of the contemplated structure of Khusru Parviz; and the deeper excavation of the scarp, for the back of the building, as described by Major Rawlinson, will sufficiently account for the obliteration of the sculptures and inscription of the celebrated Semiramis.

The antiquities pertaining to the "Storied Rock" have now been described, but vestiges of a Sassanian age abound in the plain of Chamabatan and its neighbourhood. Immediately opposite to the tablets of Darius, the piers and buttresses of an ancient Bridge, termed the Puli Khusru, occupy the present bed of the Gamasab, which, to be crossed, has now to be forded,—a matter of no small difficulty when the river is swollen by its periodical supplies from rain, and from the melting of the snow on the adjacent mountains. From the bridge, an hour's ride through rich rice-plantations and melon-beds conducts to a mound of ruin, whose surface is covered with hewn stones, and the fragments of pillars, denoting that some building formerly occupied the site. A short distance from the mound a large piece of white marble is shewn as the Yakhti-Shirin. It is about eight feet square, and the natives allege that it bears an inscription on its lower face, which is partially embedded in

* Virgins were consecrated to this Goddess, and esteemed themselves dignified by a public prostitution! Cyrus is said to have instituted the ostentatious festivals observed in honor of Anaitis, in order the more effectually to destroy his enemies, the Sacæ, by an over-indulgence in luxuries they were unaccustomed to.

† Zakariya Kasvini, from Notes before alluded to in R. G. J.

‡ On a former visit to this spot, Major Rawlinson overlooked these interesting relics. See R. G. J., Vol. IX., Part I., page 114.

the soil. This, however, is scarcely worthy of credit, for the upper surface is smoothened as if designed for some record, while the lower part, as far as we could feel by digging under it, appeared in a rough form. From its weight, we did not possess the means of overturning it, and can only surmise that it had been brought thus far on its way to Behistan, when it was abandoned from the same causes that led to the incompletion of the palace of Khusru Parviz. From the stone the Khan of Behistan bears west one farskh* distant, and the village of Sermaj due south half that distance. From this spot to the village of Sermaj, the plain is dotted with vestiges of substantial edifices, but, with the exception of an old fort adjoining the village, no erect portions could be traced. They lie scattered and broken in disordered masses, precluding any hope of defining the nature of the structures. The ancient fort, termed Kileh Khusru, is a well-constructed building of massive stone, erected on the slopes of a still more ancient tumulus that is enclosed within the quadrangle, and whose summit is now occupied by the miserable hovels of its present tenants. Both it and the modern village of Sermaj are situate in a secluded nook of some low undulating hills, called the Kuhi Harun, that bound the plain of Chamabatan to the south. A few cotton-fields and a poplar grove are watered by a copious spring which here issues from the base of the undulations. The Kurdish villagers called our attention to some large slabs, which they averred were covered with written characters, but, on inspection, they proved to be some simple devices that had been carved on a cornice of a building.

Our labors having been brought to a close on the 10th September, the ladders were cast headlong from the rock into the plain below, to prevent mutilation of the tablets. They were shivered into a thousand pieces, and caused a shudder at the thought of a false footstep consigning one to the same fate.

September 11th.—A raw chilly morning saw us on horseback at 3·30 A. M., on our return to Kirmanshah. The beautiful star Canopus,† the

* About three and a half English miles.

† Called by the Arabs Soheyl. It gives its name also, I think, to the S. S. E. point of the Arabic compass, from the circumstance of the smallness of its orbit, as viewed from the Arabian latitudes, causing it to appear, on rising, in the S. S. E. quarter. The Arabs entertain many curious notions relative to this fixed star, and relate as a positive fact that their camels can see it reflected in water long prior to its actual appearance above the horizon of the human observer. They moreover affirm that these animals, if compelled to kneel or lie down with their faces in the direction of the star, will invariably rise and turn their posteriors to it, and this only as long as the star remains above the horizon. I have frequently

forerunner of winter in these parts, first shewed itself above our horizon on this day. As we intended to visit the celebrated Arch of the "Tak-i-Bostan," our road now lay more to the north than the route we had formerly traversed on our way to Behistan. Skirting the bold chain of Parrow, we arrived at the Tak-i-Bostan at 8·40 A. M., glad enough to shelter ourselves in the shade of the arch from the rays of the sun, which by this time had become somewhat oppressive.

The Tak-i-Bostan sculptures are the finest in this part of the country, and bear at the present time so high a polish, so much grace and elegance, both of design and execution, that we must ascribe them to a period long subsequent to those of Darius Hystaspes at Behistan. It is difficult, however, to assign them a correct date, but I see no reason why the traditions of the country, which attribute them to the reign of Khusru Parviz, should not be credited. This monarch, after his defeat by Bahram, fled into the Roman territories, where he no doubt became enamoured of the many works of art which that vast empire then possessed; and after his successful wars against the provinces of the then capital of the western world, we may imagine that he secured the services of the most able artists, architects, and artisans, that could be met with, for the erection and decoration of his numerous palaces and other works in Persia of which he is the reputed founder. The incomplete state of some, and the entire overthrow of others, of these edifices, sufficiently shew that some great event suddenly occurred to stop the progress of ambition. The reign of Khusru Parviz will best accord with this event, for while in the plenitude of his arrogance and power, the Roman armies under Heraclius suddenly overran the Empire of Persia in one direction as far as the Caspian, in another to the gates of Ispahan, and requited the accumulated indignities he had heaped on Christianity by destroying every memorial of his magnificent reign. The Tak-i-Bostan has however escaped the general wreck, and appears to have awakened the interest of many travellers by the numerous marks which have been engraved on its walls. The barbarous mania of name-cutting has even extended thus far, and in time bids fair to erase what the hand of the despoiler had failed to accomplish. This spot has, I believe, often been

expressed my incredulity to the Bedu, and have sought of him a reason for so singular a circumstance, but have merely obtained the usual reply of the ignorant—"Allahi-Alam," "God knows." I can only account for it by supposing the animal to prefer breasting the cold N. W. winds, which generally prevail at this time, than to exposing his whole body to the fierce breeze from which in the other position he is naturally sheltered in a great degree by the formation of the breast-bone occupying the space between the fore-legs when in the recumbent posture.

described, and the sketches of Sir Robert Ker Porter are accurate representations. The foot of the hill has been excavated, in the form of an arch, to a depth of twenty-two feet. The height of this arch is about thirty feet, and its breadth twenty-five feet. On the left side of the arch, below its spring, an excellent bas-relief, representing a sporting scene, has been sculptured. Elephants, horses, camels, wild boars, deer, and men, are promiscuously grouped around the borders of a marsh, on which two boats are plying. The monarch occupies one of these, and is standing up with a bent bow in his hand, in the act of shooting at a retreating boar. The second boat, containing some attendant ladies, and minstrels with their instruments, serves to convey a picture of the luxury of the court. To the right of the scene, the slaughtered game, slung across backs of elephants, is being carried away from the field; and in another part, the process of flaying, preparatory to the repast, is beautifully delineated. There is, however, in the design, no regard for perspective, but men and animals are individually portrayed with a grace and action unsurpassed even at the present day. The right side of the arch bears a similar scene, but is altogether inferior to its opposite sculpture, and must have been the work either of an inferior artist or is an unfinished design of a later date. On the rock forming the back of the arch, a colossal equestrian figure, in complete armour, and armed with a long lance, stands boldly out nearly in complete relief; and above, on the pedestal forming the spring of the arch, three other figures, supposed to denote Khusru Parviz, his Queen Shirin, and the Prime Minister of the Empire, are chiselled in alto-relievo. The trappings of the horse, and apparel of the group, are worked with a very minute detail. Two winged Victories, bearing wreaths, with long flowing drapery, guard the entrance to the arch, and display great artistic skill. Above the first-mentioned sporting scene, and in sad and striking contrast with it, the effigies of Mahomed Ali Mirza, late prince of Kirmanshah, his son and his chief eunuch, occupy a conspicuous place. The prince is seated in the royal chair, and is crowned with a royal diadem, with the other personages in jewelled attire standing respectfully before him. To render this group the more striking, color has been used in aid of the unskilful chisel of the modern statuary, in whose stiff and distorted forms, compared with the master style of a former age, the prince might have read a history of his country from the time of Khusru to that of Fat'Ali Shah. The uncultivated mind, however, of the modern Persian, is ill-adapted to the conception of the beauties of art or of nature, and I have no doubt, there-

fore, that the vain and ambitious prince derived as much gratification from this paltry design as he would have done had it been executed by the hand of either a Phidias or a Praxiteles.

A few paces to the right of the Tak a smaller arch contains full length figures of the two Shapurs: they are more rudely executed than the sculptures of Khusru Parviz. A Pehlevi inscription is attached to each. Still further to the right are three colossal forms in demi-relievo, representing Ardeshir Bebagan delivering over the Sceptre of Empire to his son, the left hand figure of the group personating the Deity Ormazd, who is winged, and has his head surrounded by a glory. These figures are beautifully executed, and great pains appear to have been bestowed on the waving fillets that bind the head and reach to the knees. These comprise the whole of the sculptures in the immediate neighbourhood of Kirmanshah. For ingenuity of design, for skill in execution, and for labor in accomplishment, the Tak-i-Bostan antiquities may vie, I think, with any work of art in Persia.

A clear and sparkling spring gushes out from the hill at the foot of the sculptures, and, joined by others, forms a brawling rivulet of sufficient force to turn three or four mills which are erected in a contiguous hamlet. The spreading willow and stately poplar, lining its banks, also lend their beauties to the interesting locality. Irrigating that portion of the Kirmanshah plain laying between the Parrow range and the Kara-Su, the clear waters of the brook finally join with the latter in the neighbourhood of the Puli-Shah.* From the sculptures the city of Kirmanshah bears S. 38° W., distant six miles; and at half a mile, separated from them, on the road to the city, the site of a large quadrangular building is passed over. The aligned walls of this edifice are still traceable in a succession of low mounds, and their great extent would mark them as the remains of some stately palace. The longest sides face the north and south points, and may be about 800 yards long, with a breadth between them of 600 yards. A high tappeh or tumulus stands at its S. W. angle, probably formed by the accumulation of drift on the debris of some lofty tower which formerly occupied that part of the building. It bears at present the title of Shehri-Khusru,† but I

* This name, according to Tavernier, was given to the Bridge over the Kara-Su, on the high road from Kirmanshah to Hamadan. It signifies "Bridge of the King," but is now more generally known as the Puli Kara-Su.

† City of Khusru.

could trace no vestiges of inferior buildings within the area of the outer enclosures.

A ride of one hour and twenty-five minutes, over a champaign country, and in some places through the gardens that border the banks of the Kara-su, which we forded, brought us again to the walls of Kirmanshah. On our way to the house that we formerly occupied, we visited a garden residence of the Amir. It boasts of a few fine rooms, some fountains, and a central piece of water. These were gratifying enough, but the neglect apparent in every part of Persian administration is here evident also. The want of a timely repair is manifest in its crumbling walls, and in its decayed but once superb garden and approaches. At sunset, we were again within the walls of our former dwelling, enjoying the luxury of its fountained apartment. The same bright eyes, those of the youthful but widowed owner of the mansion, are again seen peeping from an abstracted pane in the casement of the anderun,* betokening a lively interest in the proceedings of her foreign guests; and the present of a tray of sweatmeats, surpassed in delicacy only by the compliments that accompany it, proves the interest to be as unfeigned as it is courteous. She, too, has known sorrow, and the hand of oppression is said to be even now at work to deprive her of the property left by her husband, who was known to Major Rawlinson when residing at this place during his former service in Persia, and it is hoped, through his influence, she may yet be spared the sufferings apparently in store for her.

Sept. 12th, 13th, and 14th.—During this time we were occupied in again preparing for the road. Our little chronometer was re-rated, and found to be going tolerably well, although the cold air of the hills had acted sensibly upon it. On the 13th,† the Amir made Major Rawlinson an official visit, which lasted an hour. He appears to possess neither energy nor talent, and although we several times tried to turn his conversation to topics of interest, it gradually sunk again into the matter-of-fact relations of daily occurrences. It was a stupid scene, and we felt relieved when he withdrew. I believe, however, that when excited, he exhibits an energy foreign to his appearance, and that, although taciturn

* Women's apartment.

† Packets were received this day, via Damascus and Beyrout, from England, and notwithstanding the delays requisite for their transmission from those towns and from Baghdad, the London dates were thirty-five days old only. So much for steam communication combined with the excellent dromedary post between Beyrout and Baghdad.

in public, he betrays a superior mind in the more secret councils, and possesses a shrewd cunning that is actually incumbent on, and inseparable from, the character of a Persian satrap of the present day.

September 15*th.*—Left the town at 4·25 A. M., before day-dawn, to avoid the numerous beggars that infest the streets and highways in this vicinity. In their petitions they are more importunate, and less satisfied, than any mendicants that I have ever met with. I do not altogether allude to the distressed classes, but to the servants of respectable men who may have been sent with letters and congratulations, or have been attendant on their masters when paying visits on their own especial business. All imagine themselves entitled to a fee, and purposely annoy with their services for the coveted reward. New claimants appear at every turn, and render the departure both irksome and unprofitable. Our road lay in a W. by S. $\frac{1}{4}$ S. direction, over the low undulations that we had skirted on our approach to the town. At 6·7 halted for seven minutes on the eastern slope, adjoining the Mahidasht plain, and obtained the following bearings :—

Pass over the Char-Zabar, a continuation of the Kileh-Kazi range, leading to Harunabad, 256°—Khan of Mahidasht in a line with it. Peak of Kileh-Kazi, 283.° Resumed our route at a smarter pace over the fertile plain of Mahidasht, and reached the Khan of the same name at 8·10 A. M. It stands nearly in the centre of this extensive plain, on the right bank of the small river Mirikh, whose source is about fourteen miles further to the south. The usual observations* were obtained, and the following bearings were observed from the top of the Khan :—Peak of Kileh Kazi, 294°. ⊙ centre at setting for variation of the needle, 275°. Char-Zabar Pass, leading to Harunabad, 249°. Centre of the Pass on the great Shahu range, 343$\frac{1}{2}$°. Tomb of Weis on the low undulations bordering the east side of the plain, 9$\frac{1}{2}$°. High Peak of the Parrow range, 69°. Culminating point of the same range at Behistan, with the road we came in one with it, 78°. An ancient tumulus in the plain called Chaghan Nargis, 316$\frac{1}{2}$°.

September 16*th.*—Crossing the Mirikh by a bridge on one arch, at 4·12 A. M., we resumed our route towards Harunabad, in the direction of the Char-Zabar pass. At 5·15 commenced the ascent of the pass from the Mahidasht plain, reaching its summit at 6·20, over a very rough and

* These make the Khan in latitude 34° 15′ 48″ N., and 2° 18′ 50″ East of Baghdad.

somewhat sinuous road. At 7·30 attained the summit of the Nal-Shekan Pass, ascending over a very difficult ridge of sheet rock and broken stones, ill adapted for the passage of loaded mules, and, indeed, from its steepness, affording but a precarious footing even to the unhampered beasts. Between the Char-Zabar * and Nal-Shekan Passes a fine plain (Plain of Zobeideh) is crossed, of no very great extent, and encircled by an amphitheatre of hills, the range here being hollowed out in the form of a basin. The pass over the Char-Zabar bears from the Nal-Shekan 17°, and the road onwards through the Calhur country 237°. Proceeded in the latter direction until 9h. over some undulating hills, bearing, in some places, recent furrows of the plough. At this time the road swept abruptly round a low tongue (a continuity of the Dalahu chain, bounding the plain of Harunabad to the eastward) in a direction of 285°; and at 9·35 reached the Khan of Harunabad—one of the most wretched halting-places we have as yet met with. A body of Calhur horsemen met us a short distance from the caravanserai, and escorted us as far as its walls. A miserable village, capable of affording a few scanty supplies to the caravans that stop here, surrounds the Khan; but, affording no better accommodation, we were compelled to seek, in the filthy recesses of the "hostelerie" of the caravans, a shelter from the noon-day sun, which had become very oppressive.

The spot is, however, one of some interest, as connected with the inscription, which we had heard so much of, and which we were not long in finding.

Laying on the platform of one of the vaults, a loose slab, on which a pilgrim was kneading some dough for his evening meal, was pointed out as the coveted relic. On cleaning, it proved to be the half of a tombstone, bearing, in Greek characters, the epitaph of one Eumenes Demetrius.

The four first lines were legible enough, but the remainder, apparently

* Mahomed Ali Mirza, late prince of Kirmanshah, fortified this pass, and defeated the Turkish army here, on its invading the Kirmanshah territory during the Government of Daud, Pacha of Baghdad. It forms an admirable position for defence, but no invading army should be allowed to advance thus far into the Persian dominions; as the passes in the western Zagros, even if occupied by an inferior force, offer almost insurmountable obstacles to hostile encroachments. The Thake Girrah, the Nal-Shekan, and the Char-Zabar, passes may be pronounced as almost insurmountable by artillery in their present state. The pass of Derbendi Ustaghan, lying between the Band-i-Noah and Kukan ranges, is, however, represented as a comparatively easy one for the passage of guns, and should be used if it were intended to assail Persia from the neighbourhood of Baghdad.

from want of skill, or impatience in the sculptor, were ill wrought and indistinct. The shape of the stone, with its inscribed legend, I copied as under.

This monumental fragment is said to have been found in a graveyard contiguous to the Khan; and an ancient elevated tumulus in the plain, at a short distance separated from it, would lead us to the conclusion that both were erected over the ashes of some eminent leaders of antiquity. It is not unlikely, indeed, that this fine plain was formerly the theatre of some decisive battle; and, although it is purely conjectural, we may, perhaps, assign it as the scene of conflict between some of the rival Generals who swayed the destinies of this part of Asia subsequent to the death of Alexander, and the tablet may therefore be commemorative of the name of some brave but ill-fated Macedonian, who, in that time of anarchy, fell a victim to the prevailing ambition. We endeavoured to possess this interesting relic, but could not overcome the scrupulous jealousy of the natives, who, ignorant of its real character, look upon it as a talisman, on which the well-being of the district materially depends. They attributed to its presence an exemption from famine and pestilence, which they are convinced would assail them in the event of its abstraction; and, though offering no objections to our copying it, were firm in opposing any attempts for its removal.

The present hamlet and khan of Harunabad stand on the debris of some old ruins, said to occupy the site of a town founded by the Khalif Harun-al-Rashid.* The district occupied by the Kahur tribe extends as far north as this spot. The tribe is the most powerful in the neighbourhood, and can bring a large body of men into the field. Their features are handsome and manly, with a strong Jewish cast, and their name, as Major Rawlinson believes, will also identify them as the descendants of the Samaritan captives who were placed in the Assyrian city of Calah or Halah. They are now Mahomedans, and, when not oppressed by the Government, are looked upon as a peaceful people.† We experienced much civility from them, and the conversation of their chiefs shewed a superior intelligence.

September 17th.—Mounting at 5·30 A. M., a direction of 282° was kept for fifteen minutes, and then changed to 304°, leaving the direct road to Kirrind on our left. These courses skirted the east side of the valley of Harunabad, at 6·55. The undulations bounding the valley were ascended in a line of 349°, until 8h., when the road became very winding and stony, over a higher range (a prolongation of the Larr) in a general direction from 280° to 22°. For the bare and arid soil of the lower ranges we now exchanged the oak-clad paths of the mountains. At 9h., the road held to the latter direction through some magnificent scenery, occasionally, as we turned some sequestered spot, pasing the rude tents of a Guran family. Gradually ascending, we reached the pretty hamlet of Bireyeh Khassim at 9·45, and at 10·10 the southern bend of the Zemkan R. crossed our course. From this time we skirted its east bank on a course of N. E., through a valley abounding with the willow, poplar, and oleander, until 10·55, when we arrived at our former abode at Gahwarah, in company with Shabas Khan and a numerous retinue, who on descrying us had hastened to welcome us in the usual way.

By a return to this place, we are again enabled to place a value on the performances of the Chronometer. An absence of eighteen days

* The Kurds term it Harunyeh. It stands on the east side of an extensive and well cultivated plain, that is bounded on the West by the Band-i-Noah and Kukan ranges. The latitude of the Khan is 34° 06′ 36″ N. It is East of Baghdad 2° 2′ 14″.

† The numerical strength of the tribe is represented as 7000 families. The most part are nomade, and in the winter reside in the neighbourhood of Mendalee. The name should properly be spelt Kalhur.

furnishes an ample interval; and our lengthened stay at Behistan, and two visits to Kirmanshah, afford us positive data, from daily observations, for the intermediate periods. The variations occasioned by temperature and travelling are thus corrected, and an approximate rate, which may be depended on, is thus ascertained and applied, for the days occupied in marching.

September 18*th.*—Accompanied by an escort of Gurans, we continued our route at sunrise, in a general direction of N. W., towards the heights of Dalahu. The road lay over the abrupt projections abutting from the east face of the Dalahu crest, through a forest of oak, mingled with the palm, the walnut, and the pear, but was so extremely tortuous that it would be both useless and tedious to note its various turns. It was a continued ascent the whole way, over hill and ravine, torrent and brake, until we arrived, at 2 P. M., at Bibiyan,* an encampment of Sunni Kurds, occupying a small plain under the N. E. brow of the Dalahu crest. This is a beautiful spot, and the view from a hill close to the camp is singularly magnificent. The whole valley of the Zemkan, with that clear river like a silver thread, although six miles distant, appears at our feet.

The ravines clothed with fern, and here and there highly cultivated, now tinged with the light or hid in the shade of the setting sun, extend in radial order into the valley below, and carry numerous mountain streams in their deeply furrowed beds to aid in swelling the waters of the Zemkan. We can trace several encampments on the declivity of the mountain by the smoke ascending from the evening fires, but to the north all appears a vast sea of desolation. The evening is peculiarly mild, and the peaceful avocations carrying on in our secluded camp,—indiscriminately occupied, as it is, with the human and brute species,—affords a pleasing picture of a pastoral life.

From this spot the following bearings were obtained:—mountain above the town of Gahwara, 151½°; Kileh-Kazi, 132°; Peak of Parrow, 102½°, having the centre of the Abi-Shekr plain in one with it; Centre of the Holoor plain, eight miles distant, 78°; Plain of Nirridjee, eight miles distant, to 5°; Loosheh, at the top of the plain of Mirabad, 22°; Darneh due north; pass on the high mountain range of Shahee, 87½°; opening of the Shahmar, 114°.

* Between Bibiyan and Gahwarah are several rich valleys. The principal bear the following names: Nerije, Darraweis, Girgowan, Bindar, Biyamah, and Dashtimort. Bibiyan is in latitude 34° 32′ 45″ N., and 1° 44′ 50″ East of Baghdad.

September 19th.—A fine bracing morning, with the thermometer at 51°. Shortly after dawn we were again in the saddle, threading our way along the narrow path skirting the mountain in a general direction of N. N. W. There were merely footpaths, used by the mountaineers, conducting along the heights, or tangled forest of oak and fern, quite impassable for laden mules; consequently the baggage had to proceed by a longer but less difficult road* some way further down on the slopes of the mountain. In three quarters of an hour we arrived at Kaleh Zanjir, a ruined fort occupying a strong isolated position on the summit of a naturally scarped projection from the N. E. brow of Dalahu. It may be about one and a half miles distant from Bibiyan, in a N. N. W. direction, but accuracy of the road-book was here out of the question. The decent to this spot is one of the most abrupt and tortuous that horsemen ever ventured, I believe, to accomplish; indeed, at every footstep the prospect of a broken neck was constantly before us.

Kileh Zanjir† held an important position during the flourishing times of the Ottoman empire. Situated on the frontier between Turkey and Persia, it is frequently mentioned in the Turco-Persian boundary treaties, and the remains of a town of some extent are said to exist also in the valley below. A copious spring issues from the base of the rock, and some deep wells in the interior of the fort are said to have communicated with a natural reservoir in the heart of the mountain. At the foot of the scarp the wide-spreading branches of a venerable plam tree, planted on the margin of a crystal-like stream, doubtless afforded a pleasant retreat to the garrison that was formerly kept here: at the present time it appears to hold, from the sacred relics appended to it, a revered place in the minds of the nomade hordes that dwell in its vicinity. From this position, the vale and site of the once Royal City of Dareh bears 346°.

From 7.15 (after leaving Kileh Zanjir) till 8h. we continued to cross hill and dale, in the same general direction of N. N. W., but gradually ascending to a higher elevation. In the absence of a fixed detail of route, from the difficult nature of the country traversed, we may assume

* Through the Dashti l'il valley.

* Opposite Kileh Zanjir, and on the east side of the Zemkan river, the plains of Mirabad, Nerji Holoor, and Thamar, extend from N. E. to S. E. The north end of the Kileh Kazi range terminates in the latter plain, through which the high road from Sulimaniyeh formerly conducted to Kirmanshah. It is now seldom used in consequence of the insurrectionary state of the tribes inhabiting this portion of the country.

our progress in a direct line at about $1\frac{3}{4}$ miles per hour. At the latter time we had reached the most northern brow* of the Dalahu heights, having skirted the entire face of what I term its S. E. prong. From this point, the mountain trends a little to the southward of west, to its extremity at Ban Zandeh. Here we observed Bibiyan and Killeh Zanjir bearing respectively 143° and 162°. Proceeded at 8·15 in a more westerly direction, over a less abrupt road to Paban,† an encampment of Jaf Kurds. Here we remained an hour and a half to breakfast with the Chief, and at 11·35 resumed our route, under an escort of Jaf horsemen, our friends the Gurans accompanying us no further. At 1·5 we reached Mir-Khassar, a small plain just under the west brow of Dalahu, at an elevation of about 7000 feet.‡ The last part of our journey lay over ravines well watered by springs from the heights above, and through forest land abounding with a great variety of game. Hares and partridges were sprung at every footstep, and our guns yielded additional luxuries to the Kurdish evening entertainment. The night is deliciously cool, and some regret is felt at our being compelled to quit, on the morrow, the renovating air of the mountains, for the pestilential atmosphere of the neighbouring plains. Thermometer 50° during the night.

September 20th.—Left the encampment at Mir-Khassar at 5·53, and commenced the descent of the mountain over a very rough and zigzag road, in a direction of W. N. W. After an hour's march the wooded paths no longer afforded us any shelter from the sun, the oak now becoming stunted and scarce. Another hour brought us to the foot of the range, and the road now led straight for the village of Zohab, in a W. N. S. direction, over numerous streams, which, flowing from the mountains above, unite in the plain at their base. These petty streams are thickly bordered with the poisonous yet beautiful oleander. At 9·10 we reached the miserable village of Zohab, glad enough to shelter ourselves from the fierce heat, which we sensibly feel after our sojourn on the mountains, in the mud domicile of the chief, who boasts of the proud title of Ibrahim *Pasha*,—a title derived from a progenitor, Osman, who governed the

* Between Kileh Zanjir and Palan we crossed the valleys of Kam Koweh and Girdi-Kan-Kooreh. The hill of Gudrun, in the Sulimaniyeh territory, bore from this $326\frac{1}{2}°$.

† From Palan the pass between Semiram and Sartak 329° by compass.

‡ Mir Khassar is in latitude 34° 35′ N., and 1° 33′ 40″ East of Baghdad.

district when Zohab was the capital of a Turkish Pashalic. This district of Zohab is now one of the disputed spots in the contested territories so long made the cause of quarrel between Persia and Turkey. By right it is Turkish soil; but since the invasion of Mahomed Ali Mirza, prince of Kirmanshah, in 1821, when it was wrested from the Turks, it has remained in the hands of the Persians. When in the possession of the Turks, it was the seat of Government of a Pasha, subject to Baghdad, and was comparatively a thriving place, and would continue so, did not the evils of Persian administration prevent progressive improvement. Bounded as it is by three large streams, (the Sherwan to the N. W., the Zemkan to the east, and the Holwan to the south,) and having numerous mountain tributaries traversing it in many places, this rich plain forms a material item of loss in the revenues of the Baghdad Pashalic; while, at the same time, it scarcely enriches its present possessors, from the corrupt and oppressive measures resorted to by the Kirmanshah Government. From these causes the population is annually decreasing, and since the late encroachments of the Jaf tribe, but few ryots remain to cultivate even a small portion of the grounds of this extensive rice district. Major Rawlinson, in his Notes on a March into Susiana (so often alluded to) enters with some detail into the revenues of the place for three successive years. It then yielded but 10,000 Tomans* annually, or about one-third of the sum that was derived from the district by its former possessors. The amount is now further decreased, and the town that formerly boasted 1000 houses scarcely has, at the present time, thirty tenable mud hovels. The climate of Zohab is proverbially unwholesome, and the water, though clear and not unpleasant to the taste, contains some pernicious mineral component that, if indulged in for a short time only, seriously affects the traveller. To the natives, however, it is not so baneful, but they are nevertheless aware of its bad qualities, for they recommend a raw onion to the stranger before a draught is indulged in. The water of the Sherwan, Holwan, and Zemkan, is alike deleterious, both to men and cattle; as, indeed, are, with few exceptions, the whole of the springs which have their origin in this part of the Zagros range. Fevers are very prevalent, caused, I presume, by the marshy nature of the district; and, excepting amongst the nomade tribes, but few individuals wear an aspect of health. During the summer, the heat is excessively oppressive, and the myriads of annoying insects that infest the locality are represented as almost beyond endurance. A cooler atmosphere

* A toman is a little less than ten shillings.

can, however, be reached in a few hours, and that luxury, ice, is attainable all the year round, by sending to the mountains above.

The town of Zohab* is situate about eight geographical miles almost due north of Sari-Pul, and close under the half isolated crag abutting from the N. W. extremity of the Dalahu heights. On the summit of this, the ancient fort of Ban Zardeh is perceptible in its ruined walls. It is known also as Kileh Yezdijird,† and is described by Major Rawlinson as a very strong position, both in its natural and artificial defences. A deep gorge, that is seen as you descend the hill, divides the crag from the higher mountains to the east. The tomb of Baba Yadgar ‡ is here situated, and is visited annually by numerous devotees. The locality is reckoned as a very sacred one: at every turn of the road up the mountain some shreds of cloth hanging to the branch of every conspicuous tree, —piles of stones, to which every passer by makes an addition,—or, the branches of the trees themselves, thickly clustered with circular pebbles, —votive offerings to the tutelar saint, attest the respect paid to the sanctity of the shrine. In many places these marks of veneration could be traced for miles, and I detected some of our Guran escort adding to the already abundant tokens.

Our stay at Zohab was very unpleasant, and the heat oppressive in the extreme. Towards evening all felt languid, and the very cattle partook of the general depression. The evening set in dull and cloudy, without a breath of wind to aid the circulation; and the swarms of musquitoes and sand-flies that infested the dwelling prevented the obtainment of sleep. Major Rawlinson is seized with fever, and worn out and restless. We mounted our horses at 2·55, on a morning dark as Erebus, preferring the excitement of the march to the stagnant air of the village. Occasional glimpses of the compass gave our course as 325°, over confused and barren hillocks which surround the plain of Zohab.—At 5·45, we halted on the bank of a rivulet, bordered with the oleander, for half an hour, to allow the escort to perform its morning prayers. In this short time we lost the horses of two of the party, from their having eaten of the

* In latitude 34° 35′ 22″ N., and East of Baghdad 1° 23′ 01″. The variation in 1844 was 3° 10′ West.

† Yezdijird's castle. It was to this place that Yezdijird, the last of the Sassanian Kings, fled, on his defeat by the Arabs.

‡ Major Rawlinson, in his Notes on a March into Khuzistan details the various objects of interest that are to be met with in the neighbourhood of Ban Zardeh. Royal Geographical Journal, Vol. IX., Part I., 1839.

oleander shrubs that are here highly poisonous. Resuming our march at 6·15, in a direction of 20° over the same nature of soil, we crossed the Abbasan,—a small mountain tributary, which, like the rivulet* we halted at, flows from the hills to the eastward, and joins the Abi-Shirwan about N. W. by W. of our present position, half way between the plains of Hershel and Binkudreh. From this spot we gradually ascended the slope, abutting from the bluff point of Bamu, in a direction of 30°. At 8·30 halted at an encampment of Sharaf Bayenes for an hour and a quarter. The Chief of these people, Syed Russool, is of acknowledged sanctity, and is viewed with a respect almost amounting to awe by his tribe. He wore a marked gravity, becoming his station, and, although dignified, was civil and hospitable. These Sharaf Bayenes are the terror of the neighbourhood. I shall have occasion to notice them when speaking of their chief, to whom we are proceeding, not without some anxiety as to our personal safety; for Major Rawlinson, when in the service of Persia, was employed against this very individual, and should he recognize, even after so many years, the leader of the troops who occasioned the loss of some of his tribe, he may retaliate in a way peculiar to these people, but somewhat alarming to the peaceable traveller. Re-mounting at 9·45, we took a direction of 290°, up the eastern slope of Bamu, over a steep and very winding road. An increased elevation soon brought us again into wooded scenery, similar to that of Dalahu, in which the oak predominates. This feature is, I believe, peculiar to the western Zagros, and is met with at an elevation of about 5000 feet from the confines of Armenia as far south as the Bakhtiyari country. At 10·45 we had reached the summit of the slopes, and then gradually diverged from the former course to a line of 350° along the east face of the mountain. At noon we descried the hamlet and tents of the followers of Abdullah Beg: another fifteen minutes saw us exchanging greetings with this Rob Roy of Kurdistan. He, however, rose not to receive us, which did not augur well, but, with dignified politeness, beckoned us to be seated on a platform, built around the trunk of a magnificent walnut tree, which extends its shade to some distance. A reservoir in the centre of the platform receives a copious supply of water from a spring issuing out of the mountain some feet above it, from which it again overflows, and tumbles down the hill in numerous cascades. The scene was sufficiently striking. The robber chief was seated alone on the platform, surrounded by a band of as sinister a set of cut-throats as could well be looked upon. These, attired in the spoils of numerous

* The Kara-Chem.

caravans, that had now become ragged and threadbare from a dearth of prey, consequent on the disturbed condition of the frontier, reminded me of "Falstaff's gang," but were even more ready than that celebrated band, either for war or plunder. Abdullah Beg was himself well dressed. He is of a commanding stature, with fine manly features, and, though about seventy-five years of age, appears as hale and energetic as the youngest of his followers. In this mountain retreat he maintains an implicit discipline, and his followers appear not only to fear, but to shew him a patriarchal reverence. He is well descended, and nearly connected with the Pachas of Sulimaniyeh, but as arrant a freebooter as ever existed in ancient times, or disturbed the frontier peace of kingdoms. He lives in an independent state, though professing allegiance to Persia. The Amir of Kirmanshah has several times attempted to coerce him, without effect, for, when hard pressed, by crossing the Shirwan at the ford adjacent to his mountain fastness, he seeks shelter in the Turkish territory of his relatives of Sulimaniyeh; and this protection is mutual, for the Pashas of Sulimaniyeh, when compelled to fly, either from their Turkish masters, or from intestine discord, seek an asylum in the camp of Abdullah Beg, on the heights of Bamu, secure from attack by being within the limits of Persia.

Thus comparatively safe, he carries on his depredations with impunity, bidding defiance to the Governments, plundering all, and sparing none, within his reach; and this state of affairs is likely to continue, unless, indeed, the Turkish and Persian Governors make a combined movement against the tribe. This, however, from national jealousy, is never contemplated. In conversation, it was amusing to hear his complaints of the numerous wrongs that he had sustained from the Governments,—at times, delivered with a startling energy, at others, in piteous lamentations at his fallen state; but in his fine keen eye and contemptuous curl of the lip could be traced a cunning and independence at variance with his speech. Talking of his wrongs, he said he had been hunted like a wild beast, and alluded to the time when the Gurans, under Major Rawlinson, drove him into the Sulimaniyeh territory, and sacrificed many of his people. This was touching on the dreaded point, and we immediately perceived that he had recognized the leader of the adverse party in the person of his present guest. Some time before, on the grounds of fatigue, he had requested us to lay aside our arms, but we pleaded the custom of wearing for retaining them; and this, coupled with his wily phrases and well known character, caused some anxiety as to his inten-

tions regarding us. It soon became evident, however, that it was not his present policy to act in a way he would doubtless have done under other circumstances, but he had now a game to play on his own account, and trusted in the good offices of the Major for a favorable representation to the Government; and, at the same time, the old fox was aware of the presence of the Sulimaniyeh regulars a day's march to the north of his present position. This we were ignorant of at the time, and perhaps owed much of our safety to, for Abdullah Beg, obnoxious as he is to most parties, has, as I have mentioned before, an interest in securing the good will of the Pasha of Sulimaniyeh, to whom, he was aware, we were proceeding,—and, indeed, the troops in his vicinity, he had learnt, had been sent to escort us. Finding at this juncture, that the "*fortiter in re*" would not avail him, he resorted to the "*suaviter in modo*," and by insinuating promises, sought to borrow money of Mr. H., whom he heard was a merchant,—giving as security for its future payment the proceeds of some rice-fields that had not yet even been planted, and which, of course, would never have been realized. In this, however, he was foiled, and the afternoon was eked out in topics relating to the policies of European States, with which he has some slight acquaintance. On every other subject he is as ignorant a savage as could well be met with. At taking leave of him the following morning, Major Rawlinson presented him with a watch. This he declined accepting, after placing it to his ear, and hearing the tick, alleging that he was ignorant of such things, and that, moreover, he believed some living animal was concealed "*perdu*" within the case, that might at some future time exert a bad influence on his fortunes.

We finished the day in partaking of his evening meal in company with him, and scarcely ever enjoyed one so much. The rice grown on his own grounds was, I think, the whitest and finest that I had ever tasted. To his "cuisine" we did full justice; but a thought would now and then cross the mind, that the bony fingers dipping in the same dish with you, had often performed other services for their owner, and might even exert their strength by a tenacious grasp on one's own throat. After our host left us, we canvassed the ways and means of obtaining observations for fixing the position of his "den," but were reluctantly compelled to forego them, being [illegible] pose the instruments in the situation we were then in; so [illegible] around us, we stretched ourselves out on the platf[illegible] d a rest we were strangers to in our [illegible]

September 22nd.—Awaking at the dawn, we succeeded in stealing a compass bearing* of the defile through which the Abi-Shirwan breaks, without exciting suspicion; and hearing on the previous night that an inscription existed on a stone in the valley below us, we prepared for a descent of the mountain in search of it. Dispatching the "Khoda Hafiz" to our host (who, with the privilege of age, had not yet risen, or, what is more likely, cared not to expose himself to the etiquette of leave-taking), accompanied by his son and a few horsemen, we left the hamlet of the outlaw, and descended, in an E. by N. direction, into the plain of the Pushti-Kuh. At 6·45 we reached a small camp of Abdullah Beg's people, and a stone with a few scratches on it was pointed out as the one which we were in search of. Our disappointment, therefore, was great, after having come so much out of the way. Proceeded after a halt of ten minutes in a general direction of N. N. W., over the undulating, broken, and arid ridges of the Pushti-Kuh. These ridges are composed principally of sandstone and limestone, having numerous perpendicular schistous strata traversing them in a direction from north to south, and is the most desolate piece of country we have yet passed over. The hill scenery around is, however, bold and striking. To the N. E. the high ranges of Lowsheh Shahu and Avroman, broken through by the Abi-Shirwan, bound the view; while on the W. and N. W. the precipitous hill of Semiram,† "a natural fastness of the most extraordinary strength," terminating in the successive peaks of Sur-Khushk, Sartak, and Bamu,‡ that rise to an elevation of 7000 feet, enclose the valley, which, for desolation and sterility, may vie with any portion of the globe. I must not, however, omit the small circular plain of the Pushti-badan as an oasis in the dreary waste. We saw it beneath us a little on our left, and the spot, from its animated appearance, appears to be a favorite locality of the Kurdish families. At 9·30 the road took a more N. Ely. direction, and at this time the cliff of Ban-Zardeh bore 174°, and hill of Semiram 315°, distant about five miles. From this to the Gundar ford we traversed successive heaps of the same barren nature, with such abrupt and constant ascents and declivities that it became a perfect labor to sit one's horse. At 11·50 we called a halt before passing the ford over

* No. 25 E. Abdullah Beg states that Darneh stood on the East bank of the Zemkan, and not on the left bank, as we heard from the Bibiyan people.

† Often called Shemiram.

‡ For a detailed description of these localities, see Major Rawlinson's notes in R. G. J., Vol. IX., part I., page 29-30-31, where an interesting description of the ruins and sculptures met with at Hurin and Sheikhan will be found.

the Abi-Shirwan, to refresh the cattle, and to give some rest to Major Rawlinson, who is now again prostrated with the fever caught at Zohab.

The Abi-Shirwan, or Upper Diyaleh, breaks through a defile in the high range to the N. E., and pursues a west course to the north of Semiram, through a deep and precipitous gorge, which is represented* as capable of being defended by a handful of men against any numbers. The ford at this time has only about eighteen inches water on it, but is rapid and impetuous, and in the winter must be wholly impassable. Eight piers of a substantial brick bridge,† that formerly spanned the river on the high road leading from Sulimaniyeh to Kirmanshah, along the valley of the Zemkan, are visible about one mile east of the present ford; and that small tributary itself joins the Abi-Shirwan about a hundred yards above the bridge. The river from this point to the Tigris is said to be navigable for rafts, and timber from the mountainous ranges of this part of Kurdistan is frequently floated on its stream to the Tigris and Baghdad. Both it and the Holwan, indeed, would prove valuable water communications with the low country in the hands of a good Government; and the gums, galls, and extensive rice produce of this part of Kurdistan, might be thus conveyed at a very cheap rate, instead of by the expensive caravan routes as at present adopted. When, however, we see the advantages that offer from such noble rivers as the Tigris and Euphrates, that pursue a course of several hundred miles through a country which formerly yielded four-hundred-fold to the agriculturist, lost sight of by the present imbecile ministers of Turkish policy, we cease to deplore the ruin that has gradually crept over the classic soil, in astonishment at the apathy that has caused it. In the hands of an European power,—its decreased population strengthened by emigrants from Europe, and its ancient canals restored even to a tithe of their former usefulness,—it would again become what it was in the time of Cyrus the elder. Pregnant as it then was with great events, and overrun since by successive dynasties that led to its present impoverishment, it is I believe yet destined to be the theatre of further strife, that will eventually elevate it from its abased condition to the splendour it enjoyed in the days of "the beauty of the Chaldees' excellency."

At 1·15 we forded the Abi-Shirwan, which is now about thirty yards broad, and are once again in Turkish Territory.

* In the pages of the Journal referred to in the previous note.

† Zohab-barra.

Ascended a low ridge of hills termed Melamboo, or Nilambee, which bounds the plain of Shahri-zur to the south, and separates it from the Shirwan river. From the summit of this range the river appears like a succession of deep basins,—abounding in fish, but of no great variety. Took a course of W. by N. to N. W. over the range before alluded to, and halted at Gundar,*—a Kurdish village contiguous to an ancient tumulus,—at 2 P. M. From this position, the S. E. brow of Bamu bore 220°, and the east face of Semiram 227°. It was well determined also by observation of the Sun and Saturn.

Part of an escort sent by Ahmed Pacha of Sulimaniyeh met us here, and welcomed us to the territory with true Kurdish hospitality. We learn from our new friends that many objects of interest exist in the vicinity, and as we shall miss these by keeping the direct route to the Turco-Kurdish Capital, we determine on remaining at a place called Halebjah during the ensuing day.

September 23rd.—Leaving Gundar at 6 A. M., half an hour was occupied in crossing the same low range in the N. E. direction. At 6·30, arrived at the south limit of the Shahri-zur plain, and observed bearings as follows: high peak of Avroman mountains, 42°; Gudrun peak, over the town of Sulimaniyeh, 320°; an ancient tumulus in the plain called Tappeh Kureh, distant three miles, 29°; a high peak of Seghirmeh range, 268°; Kureh Kazhao, or high peak near the pass leading through the mountains to Tabriz, 337°. Proceeded onwards at 6·42 along the north limit of the low range in a zigzag direction from N. E. to E. S. E., till 7·30,—when we reached Halebjah,† a village surrounded by a few gardens and tobacco fields. Took up our quarters in some comfortable tents already pitched for our accommodation by the obliging Pacha, who, in addition, has sent his cousin, with a company of regular infantry, to escort us to the capital. Sulimaniyeh is stated to be twelve hours from this position.

September 24th.—Continued our journey at 4·50 A. M., through the plain of Shahri-Zur, which is now highly cultivated, and abounding with villages of the Jaf Kurds. At 5·50, examined an ancient tumulus

* Gundar by double altitudes of the sun was made in latitude 35° 7′ 42″ N—by an indifferent observation of Saturn, 35° 6′ 7″ N. Its Chronometric difference East of Baghdad is 1° 29′ 54″.

† In latitude 35° 10′ 17″ N., and East of Baghdad 1° 31′ 25″. From Halebjah the following bearings were obtained:—Hill over Bamu, 346°; high peak of Avroman, 38½°; Gudrun, 316½°; Kureh Kazhao, 333½°.

called Bakr'awa,* standing on the plain, and from it obtained the following bearings: Tappeh Kureh, 52°; Halebjah, 143°; Peak of the Avroman range, 55°. This singular mound is entirely artificial, about 150 feet high, and in circumference, by pacing it, nearly 500 yards. Its summit forms an irregular indented circle, which has been divided into two parts by a wall crossing it. A shaft, in all probability the remains of a well,† is observed on its east face; and at the base of the tumulus a copious spring issues; and walls, separated from the mound by an ample ditch, serve to shew that, whatever cause may be assigned for the origin of the mound in later times, it was fortified for the defence of a town that encompassed it. Pursued our journey at 6·5, and at 7·10 crossed the Abi-Zalm, which flows from the E. N. E., and, irrigating this portion of the extensive plain of Shahri-Zur, continues its course to the S. W., until its meets with the Tajrud, about an hour S. W. of our present position. The combined streams then unite with the Abi-Shirwan, in the neighbourhood of Semiram. From the Zalm river Bakr'awa bore 128°. Proceeded at 7·20 in a direction of 330°, until 8·36, when we crossed a small branch of the Tajrud, and at 8·50 altered the course to 280°. At 9·20 halted for ten minutes on another artificial tappeh, erected on the left bank of the Tajrud, which, like the Zalm, is a stream of no great magnitude. It takes its rise‡ in the extreme north of the plain, about five miles N. W. of the town of Sulimaniyeh. From this tappeh, Bakr'awa bears 130°; Tappeh Kureh, 102°. At 9·30, went on in a general direction of 290°, but our course now became very winding, to avoid the cultivation and numerous canals, which are cut for irrigation, from the Tajrud.

Halted for the day at Yassin-tappeh,§—another singular mound of artificial construction, and evidently the work of a very remote period. Unlike the other tappehs‖ met with so frequently in this part of Kurdis-

* Gholamber from this spot bears 48½°.

† Communicating with the spring below.

‡ At a place called Tertchmar.—Vide Rich's Kurdistan and Nineveh, Vol. I., page 65.

§ Bakr'awa bears from Yassin Tappeh 122°, and Gudrun 322°. The Semiram precipices extend an angle between 152½ to 165°. Yassin Tappeh is in latitude 35° 21′ 28″ N., and east of Baghdad 1° 13′ 31″.

‖ Tappeh is a Turkish phrase, signifying mound, generally applied to artificial tumuli. Yassin Tappeh is considered by Major Rawlinson as identical with the Resen of Genesis, and in later times to have been the capital of Shahri-Zur. Rich,

tan, which are generally round, this exhibits a square form, with its angles pointing N. E. and S. W., N. W. and S. E. Its surface is nearly flat, 320 paces in diameter from north to south, and is elevated above the surrounding plain about eighty feet. A ditch, defended by a wide rampart of earth, surrounds the mound, but no traces of buildings are visible adjacent to it, and the remains of three wells, now filled with rubbish, are visible on its summit. Another tappeh* of a conical form is seen to the S. W. of it, about a mile distant.

September 25th.—Left before dawn of day to complete our last stage to the town. For an hour the road lay over cultivated land, plentifully watered by cuts from the Tajrud. It then led through the small village of Arbet, and over the skirts of the range, extending S. S. E. from the peak of Gudrun. At 10, we entered the town of Sulimaniyeh, where we found a house at our disposal, with tents pitched on an adjoining plot of grass. The house, however, was abandoned for the more gay pavi-

however, makes Gholamber, a strong fort, now in ruins, situate in a gorge at the foot of the Avroman range, where the Zalm river issues on to the plain, the capital of the district.—Shahri-Zur implies a "stronghold" or "city of strength," and is not inapplicable, considering the many fortified places situated in the district. The plain is about thirty-five miles long by ten broad, and is bounded on three sides by mountain barriers that are inaccessible except by a few very difficult and easily defended passes; and on the fourth by the Abi-Shirwan.

The soil is everywhere fertile, and yields a rich harvest in its rice-grounds alone. It is the abode of numerous families of Kurdish ryots, as well as of the Jaf, a large and powerful tribe, who owe allegiance to the Pachas of Sulimaniyeh. These latter, however, migrate in the winter to the more genial pastures to the west of the Abi-Shirwan.

* The whole district of Shahri-Zur is dotted with these ancient tumuli, and single mounds are observable in other places,—indeed over all Asia Minor, from the borders of the Mediterranean to the banks of the Caspian Sea. Most of them are conical, and are generally erected on some level spot. Their average height may be considered as 100 feet. Some have fortified summits, and are surrounded by a ditch, while others present but a smooth conical outline. Of the fortified tumuli, I may enumerate Arbil, (Anc. Arbela,) Yassin Tappeh, Bakr'awa, and the Tullul Benat and Alij, in the neighbourhood of Samarrah and Dur. Mr Rich instances also Arbet and Kiz-Kalassi in this vicinity; and many others yet unvisited by Europeans will doubtless be found in this part of Kurdistan.

Tellul is the plural of the Arabic Tel, a "mound," equivalent to the Turkish Tappeh. The present town was founded by Ibrahim Pacha, the father of Kurd Suliman Pacha, about sixty-two years ago. The Pachas formerly resided at Karacholan, on the other side of the Azmir range, but since the foundation of Sulimaniyeh (named thus in compliment to Suliman, then Pacha of Baghdad) the seat of Government has been transferred to the latter. On building the present Serai, or "palace," numerous urns containing bones, and a stone bearing an inscription, were disinterred from a tumulus that occupied the site. See note in Rich's Kurdistan and Nineveh, Vol. I., page 119.

lion, and in the society of the Pacha and his officers the day was passed pleasantly enough.

Sulimaniyeh, the capital of the Pachalic, is a collection of small and ruinous houses, bearing a more mean appearance than, I believe, the most wretched hamlet in England. This is, however, not attributable to the poverty of the Kurds alone, but to the nomade habits of its occupants, who, in the spring, summer, and autumn, abandon the town, and spread themselves over the country, either to superintend the cultivation of their lands, or to enjoy the "*otium cum dignitate*" of a pastoral life. After its second foundation by Ibrahim Pacha, it gradually improved, and in Rich's time boasted of about 1000 houses.* I believe, at the present time, it scarcely contains half that number of tenable dwellings, and is, moreover, considered unhealthily situated when compared with the more salubrious and less confined region of the adjoining plain. Built on the skirt of a low and barren range, which rises up immediately behind it, it is either entirely shut out from the cooler breezes that sweep the plain, or is visited by constant hot winds which blow from the east and N. E. over the heated ridge during the summer months.

Ahmed Pacha is the present ruler of this part of Kurdistan, and were it not for the fettering instructions that attended his investiture by the Baghdad Pacha in 1842, his enterprize and perseverance would no doubt restore the Pachalic to what it was in the time of Suliman Bey, the progenitor of the Baban or Bebbeh family, from whom he was descended. To any one acquainted with the present political hatreds existing between Persia and Turkey, it would seem a desirable object on the part of the Osmanli Vizirs to strengthen the frontier provinces so as to form a bulwark against the machinations of the Persian Court, and a threatened invasion by a Persian army. A fitter individual, I believe, for this purpose, could not have been selected than Ahmed Pacha. With a liberal education, and a taste for the new order of things, he foresaw the advantages of a regular force, and in a few months after his investiture succeeded in overcoming the scruples of his clansmen and subjects so far as to persuade them to lay by the dress of their ancestors, and equip themselves in the garb of the regular troops of the State. In a year he had raised and disciplined, according to European tactics, a respectable

* Sulimaniyeh stands in latitude 35° 33′ 1″ N., and its meridianal distance from Baghdad, by my observations, is 1° 2′ 46″ East. Rich, who remained here some months, and observed many eclipses of the Satellites of Jupiter, makes the town east of Baghdad 1° 2′ 24″.

force, which at the present time amounts to about 800 men, notwithstanding the contrary predictions of his Baghdad friends, who would have persuaded him that the attempt to organise a regular body from the mountaineers of Kurdistan would be attended with evil results to himself. With all his desire, however, for progressive improvement, and flattering as was his first essay, he finds himself an object of suspicion at the Baghdad Court. Increased imposts are laid on the province, the present assessment of which he can barely pay; and moreover, enormous sums, in addition, are demanded of him, to stop the ears of the Baghdad Pacha and other officials who are inclined to listen to the tempting offers of his brother, Abdullah Beg, now an exile in that city.* This ruinous policy of placing brother against brother, and tribe against tribe, is the besetting vice of Turkish administration, and the nefarious and ill-concealed system of bribery indulged in by high and low, though it enriches the rapacious servant of the State, prevents the spread of that just principle so necessary to the melioration of the people and the country. It is this that Ahmed Pacha so much bewails, and with justice too, for the emended condition of the Province must soon give way to the insatiate demands made upon him. Ahmed Pacha is the eldest direct descendant from the originally founder† of the Bebbeh family, and therefore the hereditary successor to the Pachalic. His next brother, Abdullah Beg, is in honorable exile at Baghdad. He is of an intriguing and ambitious disposition, and most of the present Pacha's distresses, I believe, arise from the envious temper of his brother's mind. Ahmed's appearance is not prepossessing; and an impediment in his speech renders it at times painful to listen to him. When excited, however, an energy is observable in his eye which accords with his actions; and he bears the character of a persevering man of business. In manner he is mild and gentlemanly, and, like all Kurds, frank and hospitable. Accustomed to but little sleep, he devotes most part of the night to financial and political correspondence, whilst his days are occupied in general affairs, in the

* Since this was penned, Ahmed Pacha has been deposed in favor of his brother, Abdullah Beg, now created a Pacha, and Ruler of Sulimaniyeh.

The former, fearing to trust himself to the faith of Nejib Pacha, of Baghdad, fled with a few adherents into Persia, but has since thrown himself on the protection of the Sultan, and now resides an exile at Constantinople. Much attached to the English, and to Major Rawlinson in particular, from whom he received much sound advice, his deposition is to be regretted.

† Suliman Beg Ghaze, A. H. 1088, first took the name of Baba, or Bebbeh, in addition to his own. The name of the tribe, according to Rich, is Kermanj.—See Note in his Kurdistan, Vol. II., page 85.

superintendence of his little army, and in agricultural improvements. Possessing such qualifications for a ruler, it is painful to think that his tenure hangs by a thread, and that he may be arbitrarily removed from the seat of his usefulness by the lavish promises of a higher bidder, who, in order to fufil his baneful contract, must further oppress the already distressed ryot and landholder.

I must here close the journal. The pernicious quality of the water in the regions through which we have lately been travelling has for some time affected me, and I am now rendered so weak that I must quit Kurdistan. My poor Arab, whose gentle and quiet paces induced me to bring him into this mountainous tract, as indispensable to the person that carried the chronometer, is a sufferer as well as myself, and for the last twenty days has been straggling after the party without either halter or rider. Major Rawlinson's public avocations will delay him some days longer in the neighbourhood, but as he purposes returning to Baghdad by a longer, and hitherto a less frequented, road, the astronomical observations that he may make I shall append to the journal, to render it, in this respect, the more complete.

September 29th.—Taking leave of my companions, and the kind Pacha, who has given me letters for my safe conduct on the road, I left Sulimaniyeh at noon.—Crossing the head of the Shahri-Zur plain in a W. by S. direction, over fields of rice, and occasionally wading through swampy grounds, I traversed the low range of Karadagh by a difficult path, and descended over undulating slopes to a village of the same name, romantically situated in a defile between the Karadagh and Seghirmeh chains, the latter of which rises to an elevation of about 4000 feet above the valley. The village may contain about 500 houses, and appears a quiet and thriving place. Its Governor, Abderahman Beg, a connection and stanch supporter of Ahmed Pacha, is one of the handsomest men I have seen, and possesses a frankness and urbanity of manner that at once secures the confidence of the stranger. I sat conversing with him to a late hour, during which time he was constantly occupied in dispatching and receiving letters, but at the same time he never allowed the conversation to flag. At night, indeed, the Kurds hold their mejlis or assemblies, and transact most of their business. This at least I had cause to regret, for the constant influx of visitors prevented my sleeping until it was time to mount in prosecution of the journey. By day-dawn the busy throng had all retired to rest, and I departed without a single be-

ing but those of my own party being aware of the fact. The ascent of the Seghirmeh chain was a tough and tedious job, but the scenery made amends for its weariness. The descent, however, from its summit into the Assyrian plains was a more serious affair. Most of the party led their beasts down the steep declivities of the mountain, but, from my weak state, I preferred the saddle, at the risk of a broken neck. Five hours were occupied in this of all others the most harassing travelling; and, to add to our mortification, when the skirts of the range were reached, a south wind, accompanied by clouds of dust, blew strong in our teeth, and almost blinded the party with the fine sand that swept over the country. A red and lurid haze prevented objects being seen at a hundred yards' distance, and the heat of the fierce sun was insufferable after our sojourn in the mountains. The weariest day however has an end, and the black tents of a small Kurdish tribe, subjected to Sulimaniyeh, pitched on the borders of a mountain torrent, at last sheltered us after ten hours' occupation of the saddle. The people were, however, but barely civil, and had I not had a written order for an escort of horsemen to accompany me over the next stage, which is a disturbed tract, infested by parties of rebellious tribes, I must have waited to accompany the first passing caravan, or have retraced my steps to Sulimaniyeh. The note of Abderahman Beg changed the posture of affairs, but instead of the fifty horsemen that should have accompanied me, they declared that ten were alone available, the fighting men having gone to repel an attack made by some of the Hamawend the night before. On my saying that ten were sufficient, and urging them to mount, new obstacles were thrown in my way, but seeing me determined on proceeding, about twenty armed horsemen were collected, and a like number of foot. By 8 P. M. we were again in the saddle, had forded the stream, and reached a distance of a mile from the camp, when a halt was called by the party before going through a ravine in which two individuals had been murdered the previous evening. This halt enabled the valiant escort to cool, and many objections to proceeding farther by night were started; when, tired with their vacillation, I pushed on, attended by Saleh, a Kurdish servant of mine, through an open plain about half a mile long, that led to the dreaded ravine. We had reached the head of the ravine, and halted, in hopes that the escort would follow, when a vigorous firing was commenced and kept up for some time; but suspecting its cause, I remained on the spot. Saleh, however, fairly took to his heels, and, as far as I could distinguish him, was belabouring his mule with such sturdy blows that quickly conveyed him out of my sight. Left alone, I was

compelled myself to follow, and on regaining the party, who had by this time reached the tent, I heard such conflicting statements of ambush and surprise, that I at once perceived the affair had been got up by my own party to delay the departure until sunrise. After an hour lost in reproaches and persuasions, I succeeded in getting them to accompany me,—not, however, before I had threatened to return to Karadagh. Reinforced now with ten additional horsemen, the journey was commenced and persevered in, but the utmost alarm was manifest when a suspicious spot was reached: and at one time, when emerging from a gorge, the appearance of three donkeys laden with brushwood, and accompanied by two footmen in the valley below, was, in the bright moonlight, magnified into a formidable troop of banditti. I must, however, give my escort credit for a good military education, for they occupied the sides and summit of the pass in a soldier-like style; the footmen, extended on their bellies, just exposing the mouths of their pieces over the ridge; while the horsemen, concealed in the gorge, awaited the rout of the enemy by the musketry before making the charge. To their great relief the enemy proved to be but "men in buckram," and Ibrahim Khanchi was reached at 3 A. M. without further incident.—I have been thus prolix, to shew the disappointments that may often be experienced by the traveller in this country, and to expose the vexatious obstacles that are sometimes wantonly thrust in the way to mar a speedy progress from place to place. In my case, I believe no real danger existed, or I should have heard of it before leaving Sulimaniyeh; and though the story of the murdered men was, in itself, a true one, the date of its occurrence was made to suit the present occasion, though it really happened a fortnight before.

From Ibrahim Khanchi I pursued the route to Kafrí, and thence the post road to Baghdad, where I arrived on Oct. 2nd. Finding the south wind continue, precluding all hope of observation on the road, I left my party to come on stage by stage, while I proceeded, Tartar, on to the city. The wholesome waters of the Tigris soon restored my condition, but my Arab horse died of debility the day after his arrival.

Major Rawlinson and his party, on their return, pursued the route by Karadagh, and along that range to the ruins of an ancient temple named But-Khaneh. Thence, keeping the Abi-Shirwan to his left, he passed through Kileh Tabizan-Shukeit and Shirwaneh, where he crossed the river to the village of Khanakin on the Holwan. The positions of these places, derived from his Astronomical observations, will be found in the margin.* He arrived at Khanakin on October 11th. An interval of forty-seven days had thus elapsed since our former visit to this place,

* Karadagh, Lat. 35° 17′ N., Long. 45° 25′ 15″ E. But-Khaneh, Lat. 35° 7′ 16″ N., Long. 45° 34′ 35″ E. Shukeit, Lat. 34° 54′ 50″ N., Long. 45° 24′ 10″ E. Kileh Tabizan, Lat. 34° 57′ 9″ N. Shirwaneh, Lat. 34° 38′ 42″ N., Long. 45° 9′ 43″ E.

during which time the chronometer had been exposed to various alternating temperatures, and to the perturbations incident to mountain travelling; yet it is satisfactory to add, that the position of Khanakin, on connecting the series of measurements, differs but three miles of longitude from that assigned to it on the journey outwards, and this difference, in the construction of the map, has been distributed over the whole, to prevent its attachment at one spot. The Geographical determinations, as noted in the journal, may, therefore, I think, be relied on as a very near approximation to the true positions. The bearings throughout are magnetic, carefully taken with an excellent prismatic compass by Troughton and Sims, cut from 0 to 360°,—East being 90°; South, 180°; and west 270°, and the variation of the Needle for obtaining the true Azimuth will be found among the other Astronomical data. The longitudes throughout the journal are reckoned from the meridian of Baghdad, which we now consider as definitely settled at 44° 25′ East of Greenwich, though in the construction of the map that accompanies the journal it is placed in 44° 20′ east. This however, is of little moment, and can easily be altered by placing the meridians five miles farther to the west.

A delay, consequent on other public duties, and a recall to India, where I had my time fully occupied in the compilation of a General Map embodying the work of the *Euphrates'* expedition in these countries, has prevented the completion of the journal until the present time; but from the kindness of Major Rawlinson, I am now able to append the elevations of some of the principal places included in it. These were observed by him on his recent visit to Persia, and are a valuable addition to the other Geographical data. Vide following table:—

By Colonel Sykes' Boiling Water Apparatus.

Locality.	Centigrade Thermometer.	Fahrenheit's Thermometer.	Boiling Point	Approximate Elevation.	Multiplier.	True Elevation in Feet.	Date.
Sarpuli Zohab	40°	122°	209° 25	1405	1·187	1667*	5th July.
Surkhi-dezr	31°	101⅜°	205° 60	3295	1·146	3776	6th July.
Kirrind	31°	101⅜°	202° 90	4710	1·14′	5397	7th July.
Harunabad	36½°	114°	203° 50	4392	1·171	5143	9th July.
Kirmanshah	30⅝°	100½°	202° 50	4922	1·142	5621	14th July.
Hamadan	27°	93°	200° 75	5849	1·127	6592	13th Aug.
Summit of Elwend	15½°	67°	188° 00	12843	1·073	13780	15th Aug.

Baghdad, 31st Dec., 1847. *Nitocris.*

(Signed) F. Jones.
(True copies) A. Malet,
Chief Secretary.

* Above the level of the sea, deduced by formula of Major Jackson.

ART. XI.—*On the Site of Hai, or Ai, a Royal City of the Canaanites; with a notice of those of Nob, Azmaveth, and other cities of Benjamin, the "Mount of the Amalekites," &c.* By Capt. NEWBOLD, Madras Army.

HAI, or Ai, one of the most ancient Cities of Palestine, was ranked by the Canaanites, anterior to the advent of Abraham from Mesopotamia, among their royal cities. It is first mentioned about B. C. 1921, in Genesis (xii, 6, 8, and xiii, 3, 10, and 12,) in Abraham's journey from Mesopotamia into Palestine after he had "passed through the land unto the place of Sichem, unto the plain of Moreh." Here God appeared to the Patriarch, and said, "unto thy seed will I give this land, and there builded he an altar unto the Lord." Abraham then removed from Sichem, the present Nabalús or Neapolis, "unto a mountain on the east of Bethel, and pitched his tent, having Bethel on the west, and Hai on the east; and there he builded an altar unto the Lord."* Hence, Abraham continued his journey southerly into Egypt, and on his return with Lot from the banks of the Nile, he revisited "the place where his tent had been at the beginning, between Bethel and Hai," and he here divided the land with Lot, the latter choosing for himself the then fertile valley of the Jordan, the *Ghor* and Dead Sea of the present day, prior to the fearful catastrophe of Sodom and Gomorrah. "And Lot lifted up his eyes, and beheld all the plain of Sodom, that it was well watered everywhere, before the Lord destroyed Sodom and Gomorrah, even as the garden of the Lord, like the land of Egypt as thou comest unto Zoar." After the division of the land, Abraham dwelled in the land of Canaan, and Lot dwelled in the cities of the plain.

The Ghor and Dead Sea I could plainly distinguish from the hill of Hai, but what a solemn contrast was presented by the stern desolation of their present aspect, and the smiling landscape which presented itself to the eyes of Abraham and Lot!

Before travelling farther into the scriptural history of Hai, it may be as well to observe that, up to this point, the name of the city is written with the aspirate ה, which nearly corresponds with the name of the ruins at the present day, as given me by an Arab Sheikh. The omission of the Hebrew guttural ע, *Ajin*, which is nearly the equivalent of the Arabic ع, *Ain*, may be readily accounted for by the lapse of ages, since

* In the Septuagint—"Και ἐστησεν ἐκεῖ την σκηνην ἀυτοῦ εν Βαιθηλ κατὰ θαλασσαν, και Αγγαι κατὰ ανατολάς."

which the name of the ruins has been merely an oral tradition, handed down from father to son among the Bedouins, who are now the sole frequenters of this out-of-the way and desolate tract, in the table land overlooking the Jordan. The Arab Sheikh could not write, but I made him pronounce the name distinctly several times in presence of Mr. Nicolayson, and the result was invariably the strongly aspirated "*Hai,*" حي *Khirbet-el-Hai,* خربة الحي *Ruins* of Hai. The hill on which part of the ruins stand is called *Ras-el-Hai,* راس الحي.

Hai next makes its appearance in the book of Joshua, about B. C., 1451, (vii, 2 &c.) as *Ai,* without the aspirate ע, and as Γαι in the Septuagint version,* but appears again in Isaiah as Αγγαι. Prior to the Israelites crossing the Jordan after their wanderings in the wilderness, *Ai* was the capital of a Canaanitish King; and the first city, after the fall of Jericho, captured by Joshua within the borders of the Promised Land.

"And Joshua sent men from Jericho to Ai, which is beside Beth-Aven, on the east side of Bethel, and spoke unto them, saying—Go up and view the country. And the men went up and viewed Ai."

This passage decisively proves the identity of the *Hai* of Genesis and the Ai of Joshua. Beth-Aven was not only a name applied to Bethel itself, after it became a place of worship of the golden calves in the time of Jeroboam, (whence the modern name of Bethel, "Betin,") but from this passage, and another in Samuel,† it was evidently a place nigh unto, but quite distinct from, Bethel, with which the Talmudists have confounded it.

I shall now proceed with the history of Ai. Joshua's spies, having reconnoitered the city, returned to Jericho, and advised the Israelitish leader not to permit all the people to go up against it; and said—"Let about two or three thousand men go up and smite Ai." "So there went up thither of the people about three thousand men: and they fled before the men of Ai. And the men of Ai smote of them about thirty and six men; for they chased them from before the gate even unto Shebarim, and smote them in the going down: wherefore the hearts of the people melted, and became as water."

Joshua, on this defeat, encouraged by God, went up himself by night

* Καὶ ἀπεσ τειλεν Ἰησους ἄνδρας εις Γαι ἥ ἐστι κατα Βαιθηλ.

† I. Sam. xiii., 2, 5.

from Jericho, against Ai, and sent 30,000 chosen men of valour a day in advance to lie in ambush "against the city, even behind the city,"—with the following instructions: "Go not very far from the city, but be ye all ready. And I, and all the people that are with me, will approach unto the city: and it shall come to pass, when they come out against us, as at the first, that we will flee before them, (for they will come out after us) till we have drawn them from the city; for they will say, They flee before us, as at the first; therefore we will flee before them. Then ye shall rise up from the ambush, and seize upon the city: for the Lord your God will deliver it into yourhand. And it shall be when ye have taken the city that ye shall set the city on fire, according to the commandment of the Lord."

Joshua, having sent this detachment during the night "to lie in ambush" between Bethel and Ai, on the west side of Ai, "rose up early the following morning, numbered the people, and marched up to Ai with all the people of war that were with him, and pitched on the N. side of Ai. Now there was a valley between them and Ai." "And he took about five thousand men, and sent them to lie in ambush between Bethel and Ai, on the west side of the city. And when they had set the people, even all the host that was on the north of the city, and their liers in wait on the west of the city, Joshua went that night into the midst of the valley. And it came to pass, when the king of Ai saw it, that they hasted and rose up early, and the men of the city went out against Israel to battle, he and all his people, at a time appointed, before the plain; but he wist not that there were liers in ambush against him behind the city. And Joshua and all Israel made as if they were beaten before them, and fled by the way of the wilderness." "And there was not a man left in Ai or Bethel, that went not out after Israel: and they left the city open, and pursued after Israel. And the Lord said unto Joshua, stretch out the spear that is in thy hand toward Ai; for I will give it into thine hand. And Joshua stretched out the spear that he had in his hand toward the city. And the ambush arose quickly out of their place, and they ran as soon as he had stretched out his hand; and they entered into the city, and took it, and hasted and set the city on fire. And when the men of Ai looked behind them, they saw, and, behold, the smoke of the city ascended up to heaven, and they had no power to flee this way or that way; and the people that fled to the wilderness turned back upon their pursuers. And when Joshua and all Israel saw that the ambush had taken the city, and that the smoke of the city as-

cended, then they turned again and slew the men of Ai. And the other issued out of the city against them; so they were in the midst of Israel, some on this side and some on that side: and they smote them so that they let none of them remain or escape. And the king of Ai they took alive and brought him to Joshua. And it came to pass, when Israel made an end of slaying all the inhabitants of Ai in the field, in the wilderness wherein they chased them," "that all the Israelites returned unto Ai, and smote it with the edge of the sword. And so it was, that all that fell that day, both of men and women, were twelve thousand, even all the inhabitants of Ai." "And Joshua burnt Ai, and made it an heap for ever, even a desolation unto this day. And the king of Ai he hanged on a tree until eventide: and as soon as the sun was down, Joshua commanded that they should take his carcase down from the tree, and cast it at the entering of the gate of the city, and raise thereon a great heap of stones, that remaineth unto this day."

From Ai, Joshua went to mount Ebal, where he built an altar to the Lord, and thence proceeded unto the camp in Gilgal. From Gilgal the Israelites marched towards Gibeon, Chephirah, Beeroth, and Kirjath Jearim, which are subsequently enrolled among the cities of Benjamin and Judah, and appear to be next to Ai in geographical order, as Joshua advanced westerly into the land from the Jordan on the east. When Adoni-Zedek, who was at that time King of Jerusalem, heard of the fall of Jericho and Ai, and the humiliation of the inhabitants of Gibeon, which is described (Joshua, x. 2,) as "a great city,—one of the royal cities," "greater than Ai," he feared greatly, and entered into a combination with the four Kings of Hebron, Jarmuth, Lachish, and Eglon, to arrest the Israelitish conqueror's progress. The only remaining mention of Ai in Joshua occurs in the enumeration of vanquished Kings (xii. 9.) "The King of Jericho, one; the King of Ai, which is beside Bethel, one;" &c.

I have deemed it right to be thus minute in recalling the attention of the reader to the descriptions of this once royal city, given in the books of Genesis and Joshua, as they chiefly afford the topographical details (more especially the latter) by which we are enabled to identify the present heap of foundations with the *Hai* of Genesis and the *Ai* of Joshua, as will appear in the sequel.

Hai probably remained "a desolation, a heap" (which the word literally signifies in Hebrew,) till long after Joshua's death, as we hear no more of it until mentioned by Isaiah about 738 B. C., in his prophetical des-

cription of the progress of Sennacherib from the north to destroy Jerusalem. "He is come to Aiath" (in Septuagint Αγγαι), "he is passed to Migron: at Michmash he hath laid up his carriages. They are gone over the passage: they have taken up their lodging at Geba; Ramah is afraid; Gibeah of Saul is fled. Lift up thy voice, O daughter of Gallim: cause it to be heard unto Laish, O poor Anathoth. Madmenah is removed; the inhabitants of Gebim gather themselves to flee. As yet shall he remain at Nob that day: he shall shake his hand against the mount of the daughter of Zion, the hill of Jerusalem."*

This passage of Isaiah shows clearly that Ai, or Aiath, was then a city (πολις) within a day's journey northerly from Jerusalem, and not far from the cities of Migron, Michmash, Geba, Ramah, and the Gibeah of Saul. Anathoth is a few miles northerly from Jerusalem; Migron, Laish, Nob, Gallim, Madmenah, and Gebim, have not, as yet, I believe, been identified; the rest have been laid down in the recent maps of Palestine.

Ezra enumerates Ai, B. C. 536, in his list of the Israelites who had returned from the Babylonian captivity, in connexion with the cities of Rama, Gaba, Bethel, Michmash, Kirjath Jearim, Chephirah, and Beeroth. "The men of Michmash, the men of Bethel and Ai (Septuagint Αια), two hundred twenty and three."† Nehemiah also mentions it in a similar catalogue ‡ in connexion with the same cities; and subsequently alludes to it in the list of those who cast lots to bring one out of ten persons to Jerusalem to reside in the Holy City, after the rebuilding of the wall. "The children also of Benjamin from Geba dwelt at Michmash, and Aija and Bethel, and in their villages."§ Mention occurs of an Ai in Jeremiah (xlix. 3.) "Howl, O Heshbon, for Ai is spoiled: cry, ye daughters of Rabbah, gird you with sackcloth." But this place appears to have been situated on the eastern side of the Jordan in Ammon, against which the denunciations of the Prophet in this striking chapter are thundered.

* Isaiah x. 28 and 32.—Ηξει γαρ εις την πολιν, Αγγαι· και· παραλευσεται, εις Μαγγεδω, και· ἐν Μαχμας θησει τα σκευη αυτου, &c.

† Ezra ii. 25 and 28.—"Ανδρες Βαιθηλ και· Αια."

‡ Nehemiah, vii. 32.

§ Nehemiah, xi. 31 and 32.—"Και· οι υιοι· Βενιαμιν ἀπο Γαβαα Μαχμας Αια" &c.

At no distant period after the rebuilding of the wall of Jerusalem in the time of Nehemiah, or about B. C. 443, Ai seems to have again fallen into decay, as no subsequent mention of it is met with, either in the Old or New Testaments. Probably most of its inhabitants repaired to the Sacred City soon after the rebuilding of the wall.

Josephus, the next authority after Holy Writ, makes no mention of it as an existing city in his time, but, in his history of Joshua,* he relates the siege and capture of the place by Joshua with little variation from the Scriptural version, except in his orthography of the name of the city, which the Septuagint gives as Αγγαι, but which is spelt in Josephus Αινα.—εις Αιναν πόλιν ὑπὲρ της Ιεριχοῦντος. The orthography would appear not to be the same in all the editions of Josephus, as Stephanus Byzantinus, in quoting from the Jewish historian, spells it "ANNA πολις της Ιουδαιας ὑπὲρ Ιεριχουντα." It is also called "Αιαν" by Stephanus Byzantinus. Berkelius notices this discrepancy, but concludes the places to be identical.

In the time of Eusebius and Jerome (about A. D. 330 and 400,) nothing remained of the royal city but a few small ruins, and its site was then barely pointed out. "Aggai vero vix parvæ ruinæ resident: et locus tantummodo monstratur." Its site is not very accurately described, except in being laid down as in the vicinity of Bethel, which itself, however, is very correctly fixed in the same passage.†

Masius tells us that Ai was three leagues from Jericho; and Bethel one league from Ai. And Breydenbach (A. D. 1483-84) describes its position very accurately with reference to the supposed site of Gilgal, the fountain of Elisha, Mount Quarantana (*hodie, Ain es Sultan* عين السلطان) *and Gebel Karantal* (جبل قرنطل) and Bethel. He preserves the ancient orthography of the word as it first occurs in Genesis, substituting y for i in the final, and writes it, "Hay." Bethel he states to have been once called Lusa (Luz,) and describes as lying one league northerly, and somewhat westerly from "Hay."‡

* Antiq. Jud. v. 12.

† Aggai ad occidentalem plagam vergit Bethelis, non multum ab ea distans. Sita est autem Bethel euntibus Œliam de Neapoli in læva parte viæ duodecimo, circiter milliario ab Œlia; et usque hodie parvus licet vicus ostenditur: [sed et Ecclesia ædificata est ubi dormivit Jacob pergens Mesopotamiam, unde et ipsi loco *Bethel* id est domus Dei, nomen imposuit. [Euseb. et Hieron. Onomast. Art. Aggai.]

‡ "De Galgale loco de quo dictus est supra tribus leucis de fonte Helisei tan-

No mention of *Hai* or *Ai* occurs in Abulfeda or the other Arabian geographers whose works I have had an opportunity of consulting; and its site appears to have been entirely neglected by European travellers, not excepting the sagacious Pococke, and accurate Maundrell; although its position, as well as that of Bethel, had been most accurately described, as we have just seen. The principal cause of this omission of modern travellers appears to have originated in their following the great beaten track southerly from Jerusalem to Nabalus and Damascus, instead of taking the more easterly route, prophetically described by Isaiah as that of the triumphant progress of Sennacherib towards Jerusalem, by Anathoth, Michmash, &c., not far from which, between Bethel and Jericho, the ruins lie.

Dr. Robinson and Mr. Smith, indeed, did take this easterly route: but the real site of Hai escaped them, although they very properly searched diligently for it. They state that, "after all our search, we could come to no other result than to assign as the probable site of Ai the place with ruins just south of Deir Diwan." These ruins, as accurately described, consist of "foundations of large hewn stones, in no great number, on a low hill," among which were picked up "small tesseræ, of mosaic work, such as are often found around Jerusalem." Some excavated tombs were found in the valley to the east of the hill; and "three reservoirs, dug mostly out of the rock, and bearing marks of antiquity," in the western valley. The largest, or northern reservoir, measured 110 feet by thirty-two feet, and six feet deep. The two others were deeper, but not so long or broad. The lower and deeper reservoir is fifteen feet deep.

The site of the ruins, to which no modern name has been assigned by these travellers, is described as an hour distant from Bethel, but by their map the direct distance is just two miles south of Deir Diwan. My Arab guides gave these ruins the name of *Khirbet-el-Kadîreh*, خربة القديرة. *El-Kadîreh* appears as a village in the map, immediately to the N. W. of the ruins. On the north is the deep *Wádi* of *El-Matyah*, and towards the S. W. are other small *Wádis*.

Dr. Robinson concludes by saying "that all these circumstances in-

tundem contra aquilonem in montanis a latere aquilonari Quarentene, est *Hay* civitas quam expugnavit Josue rege interfecto, ut dicitur Josue VI. De *Hay* ad unam leucam fere contra aquilonem sed aliquantulum declinando ad occidentem est Bethel civitas quæ quondam Lusa dicebatur, in Tribu Benjamin." (Breydenbach, Itin. Hierosol. Fol. 33.)

dicate an ancient place of some importance; but we were not yet satisfied that it was Ai."* Two subsequent and most intelligent travellers, the Revd. Dr. Wilson of Bombay, and the Revd. Mr. Graham of Damascus, visited Bethel, and made search for this long lost site, but in vain. "When at Bethel, we looked for some site for Ai, but, as might be expected from the preceding statement, without success."†

My own discovery of it in April 1846 was almost accidental. During many solitary rambles among the hills surrounding Jerusalem, I chanced one day to stroll to Anáta, the ancient Anathoth, and ascended the neighbouring hill of *Ras-el-Kharub*, (رأس الخروب) attended by an Arab conversant with the surrounding country, for the purpose of taking bearings of particular points, in order to endeavour to trace out some of the places mentioned by Joshua and Isaiah, on this now unfrequented road through the eastern confines of Benjamin and Ephraim. Among other places, the Arab, to my great surprise and delight, named a spot, marked by a tree on the horizon of a desert-looking tract to the E. N. E., as "*Khirbet-el-Hai*"—Ruins of *Hai:* but, as the day had far advanced, I resolved to curb my impatience to visit the place until another opportunity, which shortly afterwards presented itself.

My first trip to Anathoth was on foot, and alone: and as it presents a few details of some interest concerning the country between Jerusalem and Hai, I shall give an extract from some rough notes taken by the wayside to Khirbet-el-Hai, which will be described in due order.

Notes on the way to Anathoth and Khirbet-el-Hai from Jerusalem. 1846.

Passed the Damascus gate of Jerusalem, along its northern wall, to the N. E. angle of the fortifications, and there descended into the valley of Jehoshaphat, which I crossed diagonally, a little south of the spot where it turns to the west, covered with wheat fields, olive trees, a vineyard to the left.

The ascent on the opposite side of the valley occupied about ten minutes; and the entire distance from the Damascus gate to the summit, thirty minutes. From the top of this ridge,—which, turning southerly, connects the Scopus on the N. of Jerusalem with the ridge and peak of the Mount of Olives on the east of the city and the Mount of Offence further south,—is a magnificent view of Jerusalem—much finer, in my

* Res. II., pp. 312, 313, 118.

† Lands of the Bible, 1847. II., 288, note.

opinion, than those from the Mount of Olives, which are too near to have a similar panoramic effect. This ridge, and not far from the spot where it is crossed on the road to Anathoth, I take to be the *Nob*, whence Sennacherib, in the prophetic words of Isaiah (after marching against Jerusalem from Anathoth), was to halt in sight of the Holy City. "As yet shall he remain at Nob that day: he shall shake his hand against the mount of the daughter of Zion, the hill of Jerusalem." (Isaiah x. 32.) Travellers have looked for the ruins of Nob, but their search has hitherto proved unavailing. It was a city of the priests slain by Saul; and only once mentioned, subsequently to Isaiah,* by Nehemiah (xi, 32), in connexion with Anathoth and Ananiah, as being, with them, one of the places re-inhabited by the children of Benjamin who returned from the Babylonian captivity.

I think it not at all improbable that the present village and buildings which crown the summit of the Mount of Olives and its vicinity may stand on part of the site of Nob, the "city of the Priests," for whom its proximity to the eastern part of Jerusalem, in which the Temple is situated, would render it a convenient residence: and in fact we are told by the Talmudists, that in after times here stood the shops of those who sold offerings &c., necessary for persons who came up to Jerusalem to worship at the Temple—doves, &c., for the purification.

The first mention of the Mount in the Old Testament is made in Samuel, † when David is described as going up to the Mount of Olives to worship God. Hence it would appear that the Mount, even at this early period, was a place of peculiar sanctity. Solomon subsequently raised altars on various parts of the ridge, to Chemosh the idol of the Moabites, and to Molech the abomination of the children of Ammon, and to Ashtoreh, the abomination of the Zidonians, and for this reason it was called the "Mount of Corruption"—a name now confined by the monks to the southern part of the ridge overlooking the valley of Hinnom.‡ The only other place where it is alluded to in the Old Testament is in Zachariah,§ in his prophecy of Christ's coming and kingdom, where he

* The passage from Isaiah runs thus in the Septuagint:—"Παρακαλεῖτε σήμερον ἐν ὁδῷ τοῦ μεῖναι, τῇ χειρὶ παρακαλεῖτε τὸ ὄρος τὴν θυγατέρα Σιὼν, καὶ οἱ βουνοὶ οἱ ἐν Ιερουσαλήμ.

† II. Sam., xv. 30, 32.

‡ I. Kings, xi. 7, and II. Kings, xxiii. 13.

§ Zachariah, xiv., 3, 4, 5.

declares, in inspired language—"Then shall the Lord go forth, and fight against those nations as when he fought in the day of battle. And his feet shall stand in that day upon the Mount of Olives (το ὄρος τῶν ἐλαιῶν), which is before Jerusalem on the east, and the Mount of Olives shall cleave in the midst thereof toward the east, and toward the west, and there shall be a very great valley; and half of the mountain shall remove toward the north, and half of it toward the south." "And it shall be in that day that living waters shall go out from Jerusalem; half of them toward the former sea, and half of them toward the hinder sea: in summer and in winter shall it be." "All the land shall be turned as a plain from Geba to Rimmon south of Jerusalem; and it shall be lifted up and inhabited in her place." These remarkable changes in the physical geography of this part of Palestine have not as yet taken place. Some commentators have assumed that the prophet's expressions are figurative: but I would rather take them in their literal sense, and consider them as a prediction of events that remain still to be fulfilled in the second advent of the Messiah.

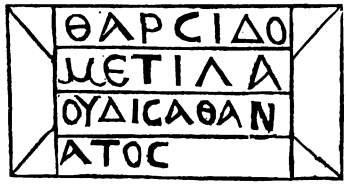
The sacred events connected with the history of this remarkable point in the ridge, as detailed in the New Testament, are too well known to be touched on here, more especially as they bear no light to the subject under discussion. The mount is generally styled throughout the New Testament "ὄρος τῶν ἐλαιῶν," equivalent to the Hebrew הר חזתים of the Old Testament, which is literally translated into Arabic by the Syrian Christians, *Gebel Zeitún*, جبل زيتون. An Arab author, Edrisi, has also written it thus: but, among the Arab common people it is generally called at the present day جبل طور *Gebel Túr*, or with the article "*Gebel-et-Túr*." Túr is a name given to the whole of the mountains forming the peninsula of Sinai. Ibn Haukel however writes it *Túr Sína:* a name which I heard occasionally used by the Monks and Arabs in the neighbourhood of the Convent of Mount Sinai. Mounts Tabor and Gerizim, in Samaria, are also called by the natives *Gebel Túr*. The word *Túr* literally signifies a mountain: though the term is almost confined by the Arabs to sacred or remarkable elevations.

That part of the ridge where Solomon built his idol temples, as before stated, was called the "Mount of Corruption."* According to Brocar

* II. Kings, xxiii. 13. "And the high places that were before rusalem, which were on the right hand of the Mount of Corruption,

dus, the Maccabees erected a castle, the remains of which were visible in his day, on the northern summit of the ridge, which he gives no name to: but Adrichomius, after him, calls it Mons Scandali. Subsequent writers, Maundeville, and De Suchem, speak of the northern point as Mount Galilee, and the latter says there was a village upon it (fourteenth century.) Quaresmius (about 1620 A. D.,) unites the names Mons Offensionis and Mons Scandali upon the southern ridge,* which I take to be likely, as these terms are evidently readings of that used by Scripture, viz., the "Mount of Corruption."

The ancient word Nob, which signifies prophecy, has been entirely lost since the time of Nehemiah, amid the great events connected with the Mount of Olives recorded in the New Testament; and its foundations lie probably buried under subsequent structures, which have also since crumbled into ruins: leaving at the present day a church, covering the supposed spot of our Saviour's Ascension, a mosque, a *Wali*, or tomb of a Mahomedan saint, and the small village of Et-Túr, with ancient sephulcral vaults excavated in the rocks, one of which is said to contain the remains of Huldah the prophetess. I copied the following funereal inscription in a vault covering two tombs; one of which, by the inscription, appears to be the resting place of Tharsidos



Metila, with the trite, but true remark—"No one is immortal." Beit Hanina, which I take to be the site of Anania, mentioned by Nehemiah as one of the cities in connexion with Nob, and Anathoth, inhabited by the Benjamites, is about four miles west from Anathoth, and about the same distance N. by W. from the Mount of Olives.

The whole ridge of Olivet, and its northerly continuation, the Scopus, command a most extensive and complete view of Jerusalem, which in fact cannot be so advantageously obtained from any other point. Parts, if not the whole, of this commanding ridge, were occupied by the armies

Solomon the King of Israel had builded for Ashtoreh" &c. Και τὸν οἶκον τὸν ἐπὶ πρόσωπον Ἱερόουσαλημ τὸν ἐκ δεξιῶν, τοῦ ὄρους τοῦ Μασθαθ, ον ὠκοδομησε Σαλωμὼν βασιλευς Ἰσραὴλ τῇ Ἀστάρτῃ."

* The south part of the ridge is called by Brocardus "*Mons Offensionis*"—a name which Dr. Robinson states he has not been able to find, nor any allusion to this spot as the place of Solomon's idolatry, earlier than the time of Brocardus, A. D. 1283, Cap. IV. Robinson's Bib. Res. I., p. 565.

of the Assyrians, the Romans, the Saracens, and the Crusaders: and from these heights, in travelling from the southward and eastward, the first view of the Holy city is obtained. Hence, Titus first gazed on its towers with longing eyes; and hence, doubtless, the Prophet depicts Sennacherib after his march from Anathoth as menacing the city from Nob, by shaking his hand against "the Mount of the daughter of Zion, the Hill of Jerusalem." As the Assyrian Monarch is made by the Prophet to approach Jerusalem from Anathoth, this ridge must have been the first spot whence he could have seen the city.

From the summit of that part of the ridge crossed by the Jerusalem and Anathoth road, Mar Elias, a convent on the Bethlehem road, beyond Jerusalem, is distinctly visible, the ground sloping gradually down to the limestone plateau on which the city stands, and to the great ravines of the vallies of Hinnom, Kedron, and Jehoshaphat, whence the surface again ascends to the east and north to the ridge of Olivet. Jerusalem, (the tower of Hippicus) bore hence S. 49° W. The lower half of the Dead Sea, part of the Ghor beyond, and the mountains of Moab, are seen from this point, as well as the valley of the Jordan, and the intervening hilly tract.

I now descended and followed the Anathoth road round the head of *Wádi Bóstan*, وادي بستان which runs E. 10° S. towards the Ghor. On its N. side, and in a low situation, stands the village of Isawiyeh, about 700 yards to the right or east of the road after passing the head of the valley. The *Wádi* runs down after being joined by the *Wádis* of *Kák* and *Zaferáneh*, كاك و زعفرانه, from the south, easterly into *Wádi Meshhad*, مشهد, and thence to the Ghor. The course from the ridge of Olivet to *Isáwiyeh* is E. 42° N., the time in descending seven minutes. The soil is whitish and chalky, with a substratum of whitish limestone, embedding flints—the Scaglia of Asia Minor. The sides of the ridge up to the summit of Olivet were studded here and there with olive trees and hawthorn bushes, and literally covered with fields of bearded wheat in ear (April.) This variety of wheat does not grow so high as the English wheat.

At *Isáwiyeh* عيسا ويه I found several sepulchral grots: two large fragments of polished limestone columns, which had evidently belonged to some ancient Church or Synagogue, foundations under the present houses, and several large hewn stones in the rude masonry.

The village consists of from fifteen to twenty houses, and several plantations of fig trees on its lands.

On hearing at this village of a "Written stone" to be seen in *Wádi Kák*, I turned from the Anathoth road to the right, down the north side of *Wádi Bóstan* to *Wádi Kák;* and after a mile walk down the valley, found to my disappointment nothing but a block of limestone, the surface of which had been unequally worn by rain and weather. On the left of the *Wádi*, and, as far as I could judge, about two miles easterly from *Isáwíyeh*, is a high round-backed hill, with apparently ruins at the top, called *Khirbet-el-Yahud* خربة اليهود—Ruins of the Jews.

From *Isáwíyeh* a slight ascent leads to the edge of a ridge overlooking the deep valley, *Wádi-es-Salím*, the steep descent into which is called "*Akabat-el-Ghazalán*," العقبة الغزلان—the declivity of the Gazelles. A troop of these graceful creatures I startled from their repose. The ascent and descent occupied eight minutes. *The* course of the *Wádi* is easterly towards the *Ghor*. Its head is in the range which flanks the left or west of the Anathoth road, and which connects the ridge of Olivet and Scopus with the hills of Benjamin and Ephraim beyond. The head of the *Wádi* is formed by the union of two rain channels, now dry, but which tear down towards the east in the winter with much fury. The road, after passing round the *Wádi* head, follows its course for some distance to the right, and then, turning to the left, or southerly, passes over the shoulder of its northern bank after an ascent of considerable length. Towards the summit a rock-cut cistern lies in the road; and beyond on the right rises the high round-topped hill called *Ras-el-Kharub*, راس الخروب—the promontory or hill of the Carob tree.

At the bottom of *Wadi Salim* I threaded large herds of camels and sheep, pasturing on the sides and bottom of the valley. Some Arab shepherds reclining lazily under the rocks, stated they belonged to the Arabs of the Ghor, whose black camel-hair tents I had passed in my way from *Isáwíyeh* to *Wádi Kák*. The ascent from the bottom of the *Wádi* to Ras-el-Kharub occupied fifteen minutes. On the top of the latter I found several ancient cisterns, lined with cement, like those on Mount Olivet; and a sepulchral grot cut in the rock. Hence is a fine prospect of the country: in front extends a tract of broken hilly land, descending from the right of Benjamin and Mount

Ephraim on the left or west towards the valley of the Jordan on the east. The formation is a white chalky limestone, so firm in texture as to be employed for building the Protestant Church on Mount Zion, now fast approaching completion. Much of the stone is quarried from this hill: and in it I found several fossils; among others a large Ammonite nearly a foot in diameter. The hills of Benjamin, which continue northerly to Mount Ephraim, form a ridge running nearly N. by S., broken into round-backed masses by transverse ravines, or *Wádis*, descending easterly into the valley of the Jordan. The view to the west is confined by this ridge, which commands the road, as it proceeds to the north, along its eastern slope by Anathoth and Michmash to Bethel. The view to the north and east is open, and presents a desolate aspect from its almost treeless state, and chalky broken-up surface. The vast sheet of scaglia and cretaceous limestone which covers the greater part of Palestine as it descends to the steeps flanking the *Ghor* or valley of the Jordan, becomes more and more fractured and disturbed; and presents a confused assemblage of fantastically-shaped hills, ridges, and cliffs, often of dazzling whiteness and arid sterility. The deep ravines intersecting this tract render it almost impracticable to the Turkish troops; and as these cracks in the surface all ultimately debouch in the valley of the Jordan, this wilderness is a favourite resort of the Arabs of the Ghor, who creep up the ravines with their flocks and herds to the fine pastures covering the slopes of Benjamin and Mount Ephraim.

I took the following bearings from Ras-el-Kharúb :—

Anathoth (Anàta,) (ten minutes distances) N. 20° E.; beyond Anata Hizmeh, N. 20° E.; Betín (Bethel,) N. 10° W.

It was while taking these bearings that the ruins of Hai were pointed out to me by my Arab guide, as previously mentioned; also "Khirbet *Alamet*" خربة علميت doubtless the Alemeth of Benjamin, a little to the N. E. of Anathoth, and which will be described hereafter. The ruined village *Kefr Náta*, said to be about four hours northerly from Anathoth, was also pointed out; as well as the rock of Rimmon and Er Ram—the Rameh of Benjamin,—but a thin haze coming on prevented any reliance on the bearings taken of the places at the time.

From *Ras-el-Kharúb* I proceeded to Anathoth along the edge of a high spur having the deep steep-sided *Wádi Benít* وادي بنيت on

the left. The flat bottom of the *Wádi* is divided by the course of a streamlet, and its banks were cultivated with wheat. It runs into *Wádi Salím*, which opens into *Wádi Sedder:* and the last named *Wádi* is said to communicate with the Ghor through the great *Wádi Fárah*, which would appear to be the principal channel into which these tributaries debouch before arriving at the Ghor.

Exclusive of delays on the road, the time taken from Jerusalem to Anathoth (hodie Anáta عناتا) was an hour and ten minutes, which will make the distance by the road at my usual rate of walking little more than four miles. General direction from Jerusalem, N. 38° E.

The site of *Anathoth*, its distance and direction from Jerusalem, have been clearly specified by Josephus, Eusebius, and Jerome. The present village of *Anáta* has long been known to the Monks of Jerusalem as the site of Anathoth, a city of the priests of Benjamin, a city of refuge, and the birth place of the Prophet Jeremiah. "Now therefore, why hast thou not reproved Jeremiah of Anathoth, which maketh himself a Prophet unto you?"

"And Jeremiah said, The word of the Lord came unto me saying,—'Behold, Hanameel, the son of Shallum thine Uncle, shall come unto thee, saying, Buy thee my field that is in Anathoth: for the right of redemption is thine to buy it.' So Hanameel mine Uncle's son came to me in the court of the prison according to the word of the Lord, and said unto me,—"Buy my field, I pray thee, that is in Anathoth, which is in the country of Benjamin: for the right of inheritance is thine, and the redemption is thine.' And I bought the field of Hanameel my uncle's son, that was in Anathoth, and weighed him the money, even seventeen shekels of silver. And I subscribed the evidence and sealed it, and took witnesses, and weighed him the money in the balances. So I took the evidence of the purchase, both that which was sealed according to the law and custom, and that which was open. And I gave the evidence of the purchase unto Baruck the son of Neriah, the son of Maaseiah, in the sight of Hanameel mine uncle's son; and in the presence of the witnesses that subscribed the book of purchase, before all the Jews that sat in the court of the prison. And I charged Baruck before them saying, —Thus saith the Lord of Hosts, The God of Israel; Take these evidences, this evidence which is open; and put them in an earthen vessel, that they may continue many days. For thus saith the Lord of Hosts, the

God of Israel, Houses and fields and vineyards shall be possessed again in this land."* I have quoted these passages from Jeremiah not only as commemorative of a remarkable episode in the history of Anathoth, but as exhibiting a strong proof of the tenaciousness with which the Jews regarded the hereditary tenure of the land, and the precautions taken even in the sale of a field; precautions which are to this day observed by the Turks, the present possessors of the land of Israel, who will not admit of any Jew or Frank becoming permanent landholders. A Mussulman at the present day, desirous of purchasing a field in Anathoth, would have to go through similar forms of purchase, substituting the Cazi of Jerusalem for Baruck in the registry of the deed of sale; and the Mahkemeh for the earthen vessel. This account of the purchase by the prophet, of the field in Anathoth, affords also a striking illustration of the disordered state of the country under the Chaldean yoke during the Babylonian captivity, and was made expressly by Jeremiah as a token of the "Gracious return" of the Jews to their native land, which he then prophesied. The yoke of the Chaldeans hardly pressed so heavy on the land as that of the Turks, at the time of my visit to the prophet's birthplace.

"And fields shall be bought in this land, whereof ye say, It is desolate without man or beast: it is given into the hands of the Chaldeans. Men shall buy fields for money, and subscribe evidences, and seal them, and take witnesses in the land of Benjamin, and in the places about Jerusalem, and in the cities of Judah, and in the cities of the mountains, and in the cities of the valley, and in the cities of the south. For I will cause their captivity to return, saith the Lord."† It is sincerely to be hoped that the hour is not far distant when the present curse under which the land groans, from Dan, even unto Beersheba, shall be removed and for ever.

Of ancient Anathoth‡ nought but a few rock-cut cisterns tomb and foundations remain,—partly covered by a miserable village of some twenty or thirty houses, inhabited chiefly by Arab Fellahin (Mussul-

* Jeremiah, xxix. 27, xxxii. 6, 15.

† Jeremiah, xxxii. 43, 44.

‡ The first mention of Anathoth is in Joshua, xxi. 18, as one of the forty-eight cities alloted to the Levite priests, the children of the Kohath: it occurs in connexion with Geba-Gibeon and Almon: and again in Chronicles vi. 60, vii. 8, with Gibea and Alemeth. Abiathar the High Priest, whom Solomon deposed, saying—"Get thee to Anathoth into thine own fields, for thou art worthy of death," (I. Kings, ii. 26,) is supposed to be an ancestor of Jeremiah. Isaiah mentions it, as observed already (x. 30.)

mans) under a Sheikh.—Part of the foundations of its old wall of hewn stone can still be traced: and a little to the south of the village is a large building of more modern date, containing hewn stones, some of which are in the style called "Frosted rustic." Here is also the capital of a Corinthian pilaster. On the west close to the village is a rock-sepulchre. Four steps cut in the limestone lead down a narrow passage to the pigeon-hole entrance, through which I drew myself with some difficulty into a sepulchral chamber about six feet square. On three side were crypts shaped thus cut into the rock: in one of the crypts two troughs for corpses were excavated in the rock floor,—but the two others contained only one trough. Here probably was the family burial-place of one of the Levite priests.* Jeremiah himself, who was the son of *Hilkiah* a priest of Anathoth, was not buried at this his native city, but took refuge in Egypt, with Baruck and a great number of the Israelites, from the tyrannies of the Assyrians under Nebuchadnezzar. He is supposed to have died in Egypt, and it is said that his bones were carried by Alexander the Great to Alexandria.†

Not far from the rock sepulchre is a cistern supported by a square pillar with a square base, all hewn out of the rock. A few olive and fig plantations in the vicinity of this village are strikingly contrasted with the almost treeless aspect of the surrounding country.

Such is the present desolate state of Anathoth. (1846.)

The denunciations of the prophet, who here in early youth was persecuted by his fellow citizens—"the men of Anathoth," who sought his life, saying, "Prophesy not in the name of the Lord, that thou die not by our hand,"—seems completely fulfilled. "Thus saith the Lord of hosts; Behold, I will punish them: the young men shall die by the sword: their sons and their daughters shall die by famine: And there shall be no remnant of them, for I will bring evil upon the men of Anathoth, even the year of their visitation."‡

After Jeremiah, Anathoth is only once alluded to in the old Testament, about B. C. 443, when Nehemiah mentions it with Nob, Ananiah, Michmash, Geba, and other places still inhabited by the children

* Jeremiah, i. 1. "The words of Jeremiah, the son of Hilkiah, of the Priests that were in Anathoth in the land of Benjamin."

† Carpzov. Introduction, part 3rd, page 138.

‡ Jeremiah, xi. 21, 22, 23.

of Benjamin. Since that time, and throughout the New Testament, Scripture is silent on the subject of Anathoth. The literal meaning of the word Anathoth ענתות is, an answer, song, affliction: in the Septuagint it is written Ἀναθώθ. In the modern Arabic عناتا.

Remains on the Mount of Olives.—Having taken the bearing of a place situated on a high round hill, and which was described as a ruined village called Jajul ججول N. 40° W. from Anathoth, I returned to Jerusalem, resolving to visit *Hai* on the first opportunity. A few days afterwards, accompanied by Mr. Critchlow, the architect of the first Protestant Church on Mount Zion, I again repaired to Anathoth, and proceeded on horseback by way of Hizmeh towards the site which had been pointed out to me by the Bedouin shepherd as the *Khirbet-el-Hai.* But, previous to giving the particulars of our route, it may be as well to mention, that in returning to Jerusalem from my first trip, I look the upper road, along the top of the Olivet ridge from *Isáwiyeh,* which lies a little to the east of that leading directly over the ridge to Jerusalem already described. During the whole of this evening's walk along this elevated edge the prospect to the E., W., and S. of it, was superb: the sides of the hills were covered with wheat, and dotted with olives; and the rays of the sun, fast sinking behind the western mountains of Judea, threw the highly irregular and picturesque surface of the country into a variety of light and shade absolutely magical in its effect. On the one side, golden wheat fields and smiling verdure; on the other, the gloomy abyss of *El-Ghor,* and the dark waters of the accursed lake, sleeplessly heaving at the bottom of their deep basin. During this walk I again made diligent search for the site of Nob—as may be supposed. About ¼ of a mile Northerly from the Church of the Ascension, and the village of *Et-Tur*—which crown the central peak of the Mount of Olives, on a small plateau I came upon the remains of an ancient paved road, and the fragments of two columns still erect:—a few foundations could be traced in the adjacent wheat fields, but the whole of the ground of the Northern part of the Mount of Olives has been so often turned over by the plough that it would be matter of wonder if any distinct traces of an ancient city, like that of Nob, should be remaining in *situ* at the present day. But I am of opinion that the modern village of *Et-Tur,* and the Church of the Ascension, mark its southern extermity, and that its northern wing extended towards the Jerusalem and Anathoth road where it crosses the ridge, comprising a distance of nearly 1000 paces along

the edge of the elevation. Near the southern peak of Olivet,—the supposed mountain of corruption, or offence,—I found a small mound of masonry, covered with earth, evidently of high antiquity, which may possibly mark the site of one of Solomon's high places to Moloch. Near it lay a small but perfect pillar of fine-grained polished limestone eight feet long—diameter of base one foot six inches, and of the top one foot four inches: the filleted base and capital strikingly resembled those of the pillars in the older synagogues of the Jews. It certainly was not of any known order of Roman or Grecian architecture. The base and capital were hewn out of the same block, and not separated from the shafts: the height of the former was one foot three inches, and of the latter one foot one inch.

Route from Anathoth to Hai.—From Anathoth we descended a steep rugged declivity to the bottom of a *Wádi* which our guide, an Arab of the country, called *Wádi-es-Sennam*, وادي الصنام—the Valley of Idols, but which Dr. Robinson has written *Es Selam*, and which runs north-easterly into *Wádi Fárah*: the descent occupied nine minutes. At the bottom is the channel of a winter torrent, which follows the course of the *Wádi* to the valley of the Jordan. It was then dry, and we pursued its rugged bed for some distance, leaving on the right the *Wádi Bir Ajal* بير عجل, marked by a green verdant patch. The steep south side of the *Wádi* seemed flagged with great smooth slabs of grey limestone, divided by countless fissures. The inclined surface of these planes added to their smoothness, renders the descent difficult to horses. We turned up the left or N. side of the *Wádi*, and after a slight ascent and descent, ascended to Hizmeh, which stands on the summit of its left bank, apparently in a lower position than Anathoth, from which it bears N. 20° E., distant fifty minutes, or about three miles by the road. The direct distance I calculate at about one and a half miles.

Hizmeh (حزمة) I take to be the Azmaveth of Benjanim, עזמות,—the Αζμωθ of the Septuagint. It is first mentioned in scripture by Ezra (ii. 23-24,) in his enumeration of the principal persons who returned from Babylon, in connexion with Anathoth. "The men of Anathoth, an hundred twenty and eight, the children of Azmaveth forty and two." Nehemiah, (vii. 27, 28,) in a similar enumeration, places these two towns together, and in describing (xii. 27, 28, 29) the dedication of the new wall of Jerusalem, he states that "The sons of the singers gathered themselves together, out of the plain country round about Jerusalem, and from the villages of Netophathi; also from the house of

Gilgal, and out of the fields of Geba, and Azmaveth: for the singers had builded them villages round about Jerusalem."

From these and succeeding passages it is clear that Azmaveth was not far from Jerusalem, that it was in the border of Benjamin in the vicinity of Anathoth, Ai, Michmash and Gilgal, and that it was a town of the Levites and singers in the service of the Temple. This geographical description accords perfectly with the position of modern Hizmeh, which is one and a half mile from Anathoth, five and a half miles from Jerusalem, about three miles by the road from Ai, about ten miles direct from the supposed site of Gilgal, and within the ancient border of Benjamin.— There is a similar difference in the orthography of the original Hebrew word and the present oral and traditional name, as that which I have previously explained in speaking of Hai, and which exists also in the finals and medials of the modern Arabic names *Jiba* for *Gibeon*, *Yafa* for *Japhia*, *Jilboa* for Gilboa, &c. Otherwise, the Hebrew gutteral Ajin, ע, is seldom dropped or changed into an aspirate, having its equivalent in the Arabic *Ain*. The present village contains about thirty houses of Arab Mussulman *Fellahin*. Like Jerusalem, it has no wells of living water, but the supply is chiefly derived from rain water collected in an ancient cistern on the northern slope of the ridge on which the village stands. There are several caverns in the rock underneath the village, the entrances of which are closed by wooden doors: they are now used for the most part for stables for cattle, goats, &c. Several hewn stones, and part of a column, are seen in the walls of the village, and there are some traces of foundations in its vicinity. The southern slopes of the hill were covered with wheat. The inhabitants seem squalid and wretchedly poor. A fine view of the valley of the Jordan in the vicinity of Jericho is obtained from this ridge: a green line of verdure marks the serpentine course of the sacred river towards the Dead Sea. I took the following bearings from the heights of Hizmeh:—

Er Ram (Rama,) W. 36° N.; Jiba (Gibeah,) N. 5° W.; Tel-el-Fúl, W. 15° S.

As we were taking these bearings and gazing on the desolate landscape presented by the land of Benjamin and Mount Ephraim before us, our attention was simultaneously rivetted by some long structures on the lower slope of the mountain on which *El-Giba* (Gibeah) stands. On my asking their name from the Arabic Sheikh who was with us, he immediately replied, "*Kabúr-el-Amálekéh*" قبور العمالقة—the Tombs of Amalek. The present Arabic orthography of the latter word

closely corresponds with the ancient Hebrew. These tombs are five in number: we visited and took measurements of them on another excursion into Mount Ephraim. They are evidently of high antiquity, and resemble the long tombs at the base of the pyramids of Ghizeh more than any of the Sepulchres around Jerusalem, or in other parts of Palestine or Asia Minor which I have visited; and also differ strikingly from the long tombs pretended by Moslems to cover the remains of Noah and other partriarchs in the East. I have sent to the Royal Asiatic Society of London a short description of them, with a drawing by Mr Critchlow, the architect who accompanied me. It is not improbable that the ridge on which *El-Jiba* stands may have once been considered as the southern prolongation of Mount Ephraim; and that the present tombs of Amalek mark the position of the Mount of the Amalekites in the land of Ephraim near Pirathon the burial-place of Abdon the Perathonite. The city of Ephraim, mentioned by John (xi. 54,) and placed by Eusebius at eight miles N. from Jerusalem, cannot be far distant, if the position assigned it by the Jewish historian is correct. The Amalekites not only appear to have possessed colonies on Mount Ephraim, but even penetrated the country beyond, so far north as the valley of Jezreel,* where they were signally defeated by Gideon, who sent messengers throughout Mount Ephraim to come down against them and the Midianites and take before them the waters, even unto Beth-barah and Jordan.† This eastern border of Benjamin and Ephraim, from its proximity to the valley of the Jordan, appears to have been peculiarly subject to the incursions of the southern and eastern tribes, which, marching up the Ghor, found ready and safe access into the land by means of the many deep lateral defiles by which the country is intersected, as Joshua himself did from Jericho, in his successful invasion of the border cities of Canaan. Here was the scene of the many bloody conflicts between Saul who resided at Gibeah *El-Jiba*, the Ammonites, the Philistines who had a garrison in Michmash, and probably the Amalekites. On the hill of Gibeah, (Saul's birth place) the Gibeonites hanged Saul's seven descendants. Between Michmash, which is a little to the north of the tombs of Amalek, and Gibeah, Jonathan smote the Philistines while Saul tarried in Migron, which is in the uttermost part of Gibeah,—and while the watchmen of Saul in Gibeah looked on. The passages by which

* Judges, vi. 33 —" Then all the Midianites and the Amalekites, and the children of the east, were gathered together, and went over and pitched in the valley of Jezreel."

† Judges, vii. 24.

Jonathan sought to go over unto the garrison of the Philistines are still to be seen, as well as the caves and defiles of Mount Ephraim in which the men of Israel had hidden themselves for fear of the Philistines on that memorable day, and from which they emerged and joined in the pursuit when they heard that the Philistines fled. From Michmash the battle passed N. westerly to Bethaven or Bethel, and thence the pursuit was carried westerly and southerly to Ajalon. After this Saul turned against his enemies on every side—Moab, Ammon, and Edom, "and smote the Amalekites and delivered Israel out of the hands of them that spoiled them."* And Saul smote the Amalekites from Havilah until thou comest to Shur, that is over against Egypt.† The Amalekites were afterwards completely driven out of the land into the south by David: and the last mention of this once powerful nation in Scriptures occurs in Chronicles,‡ about B. C. 726, in the time of Hezekiah, when "some of them, even of the sons of Simeon, five hundred men, went to Mount Seir, having for their Captains, Pelatiah, and Neariah, and Rephaiah, and Uzziel, the sons of Ishi. And they smote the rest of the Amalekites that were escaped, and dwelt there unto this day." Thus literally hath been fulfilled the sublime prophecy of Baalam the son of Beor—commencing with, "I shall see him, but not now: I shall behold him, but not nigh: there shall come a star out of Jacob, and a Sceptre shall rise out of Israel." "And when he looked on Amalek, he took up his parable, and said, Amalek was the first of the Nations: but his latter end shall be that he perish for ever."§

Route to Hai.—A few mounds of unhewn stones are all that now remain of Amalek, the first born of Esau, in the land of the covenant. Our route towards *Hai*, from *Hizmeh*, lay to the east of the road to Gibeah, down the northern side of the ridge of Hizmeh, into *Wadi Zerreik* وادي زريك, which Dr. Robinson supposed to be *Wádi Faráh*, and which is indeed one of the heads of *Wádi Faráh*. The descent into the *Wádi* is steep and rocky, and though the distance is but short, it cost us twenty-one minutes to reach the bottom. Lower down the *Wádi* is a spot called *Ain Jisjah* عين جسجة—probably a spring, as the name imports. The ascent of the northern side is less abrupt, and covered with a rich brown loam, now being ploughed for the *Dhurrah* crops. Arrived at the top,

* I. Samuel, xiv. 48. † I. Samuel, xv. 7. ‡ I. Chronicles, iv. 42 and 43.

§ Numbers, xxiv. 17-20.

we stood on a table land sweeping with a gentle slope from the hills of Gibeah on the left, to the edge of the declivities which skirt the valley of the Jordan on the right. In front, a little on our right, rose the round-topped hill of *Ras-el-Hai*, which we reached in twenty-nine minutes from the bottom of *Wádi Zerreik*; from Hizmeh fifty minutes, or about three miles by the road; and from Anathoth one hour and forty minutes. Ras-el-Hai bears from Hizmeh E. 18° N., and from *Tel-el-Ful* E. 17° N. The ruins lie exactly in the line of the most direct route between Jericho and Bethel, nearly S. E. from the latter. The direct distance to Jericho from Hai is about 9½ miles, and to Bethel about 4¾ miles. On the summit of *Ras-el-Hai* are foundations of a strong wall of cut stone, not rustic, but with as grey and weathered an aspect as that of the surrounding limestone rocks. The hewn stones do not run above three feet by two feet or one and a half feet thick. One side of the wall is four feet four inches thick, and rises from two to three feet above the surface of the ruins. It is faced with cut stones fitted and laid without cement, the interior being composed of smaller rough stones carefully put together as in certain structures of cyclopean architecture. The foundations of one of the buildings, which is enclosed by this Peribolus, measured twenty-five paces by fifteen paces. A mass of rubbish of hewn and rough stone and earth covers the top of the hill, among which we found a very carefully cut stone, like the keystone of an arch; and also the remains of a column with filleted base, like that on Mount Olivet, already described. Amid the rubbish are bits of marble and fragments of black and red pottery. Similar fragments are also turned up by the plough in the adjacent fields.

From the hill of *Ras-el-Hai*, on which probably stood the Acropolis of this once fortified place, run the foundations of a structure in a N. westerly direction across the valley and up the opposite heights; but whether this was originally the wall of the old town prolonged to defend the pass through the valley, or the remains of an aqueduct, I did not determine. The foundation of this well-built structure may be traced on the sides and round the base of the *Ras*, and the remains of a paved road, or street, leading up to the citadel on the western side within the peribolus. The defiles in the heights on the west of the place would form convenient places for Joshua's ambush.

The valley separating them from the town is not above a quarter of a mile broad. Immediately on the N. is the deep and precipitous-sided

[illegible] which [illegible]
[illegible] straight [illegible]
[illegible] is the entrance [illegible]
[illegible] great heap of stones on the
[illegible] whom he had [illegible] on [illegible]
[illegible] stunted fig trees [illegible]
[illegible] aspect of the surrounding [illegible]
[illegible] on the east of the ruins, besides
[illegible] *[illegible]einit*, are several other rock caves.
[illegible] and is approached by a descent of
[illegible] the sepulchral caves north of Latikia on
[illegible] the vicinity of Tyre. The interior of
[illegible] not having lights we could not explore
[illegible] small rock-cut cisterns lie in the vicinity.
[illegible] distinctly seen from *Ras-el-Hai*, and also
[illegible] not Jericho itself, with the mountains of
[illegible] not the Dead Sea, the locality of which was
[illegible] haze.

600,000 men could only create confusion on this occasion without any necessity for such numbers; but the generality of interpreters, he adds, acknowledge two bodies to be placed in ambuscade, both between Bethel and Ai,—one of 25,000, the other of 5,000 men.

From these unsatisfactory attempts at reconciliation of the two passages of Joshua, it is refreshing to turn to the words of scripture itself, where it is distinctly stated that two parties were sent into ambush on the west of the city between it and Bethel: the first party of 30,000 men was sent over night from Jericho—before the march of the main body of the Israelites; and the second of 5,000 men was detached from the main body the following morning, *after* the arrival of the main body before Ai. There is no mention of Joshua's having withdrawn the first party, or of his having detached the second party from the number of the first party; consequently we must infer that 35,000 men lay in ambush on the west of the city between it and Bethel. No statement in the chapters quoted can warrant any other conclusion. If a conjecture may be hazarded as to Joshua's reason for detaching a second party of 5,000 men from his main body, for the same duty as that assigned to the detachment of 30,000 sent into ambush the preceding night, it is this,—that the Israelitish General purposely weakened his main body (ostensibly) in order to secure the success of his manœuvre by inducing the garrison of Ai, when they saw the weakness of the force with Joshua drawn out against them, to sally forth from the city to the attack, as they had successfully done before when Joshua had sent 3,000 men to take the city a short time previous. It is by no means clear what number of men Joshua had with him on the N. of the city, or out of the 600,000 affirmed by Masius what number were bonâ fide fighting men. But it is, I think, reasonable to suppose that Joshua sent by far the greater portion of his army to be concealed in ambush; while he, with a small force, remained in the plain before the city, in order, as before stated, to tempt the garrison of Ai to make their fatal sally. The whole of the garrison amounted only to 12,000 souls, women included. They were all put to the sword. (Joshua vii. 25.) This book also affords us a clue to the average size and population of the cities of Caanan in Joshua's time. The royal city of Gibeon is styled "a great city" "greater than Ai." And the then King of Jerusalem, Adonizedek, when he heard that Gibeon had sued for peace from Joshua, feared greatly for his own city, "because Gibeon was a great city." (Joshua, x. 1 & 2.)

The notes of our journey from Hai, down *Wádi Fárah*, towards Jericho, and to *Khurbet-et-Tel* in *Wádi Fárah*, and to *Khirbet Alamit*, خربة علميت, the site, as I take it, of the Alemeth of Benjamin, must be deferred until a more convenient opportunity.

ART. XIII.—*Remarks on the Gulf of Cutch.* By Captain G. FULLJAMES, Bombay Army.

[Communicated by the Author.]

1.—HAVING lately had occasion to visit the different Bunders (ports) and Creeks in the northern part of the Gulf of Cutch, I was much struck by the great want of accuracy in all the printed Maps I have yet seen of that locality; even the map of Cutch by the late Sir Alexander Burnes, makes the Gulf an open sea north of Toona, without Islands or obstructions to its junction with the Runn. The locality being interesting from its connection with the small and large Runn, about which much has been written, and many opinions formed, I trust the following observations may not be altogether devoid of geographical interest.

2.—Previous to my visit I had examined a native chart lent me by Lieutenant-Colonel Roberts, Political Agent in Cutch, made by a Bhatteea in the employ of H. H. the Rao of Cutch: in this, the northern part of the Gulf appeared choked up with islands, and so unlike any of our own maps that I could scarcely believe it possible land existed as laid down and that none of our surveying officers should have noticed it. Actual personal inspection has, however, convinced me the chart is nearly correct, and our maps wrong: a reduced copy of the said chart I have the pleasure to enclose with this.

3.—It will be observed in this chart, that immediately north of the fort of Toona in Cutch, the Gulf is obstructed and almost closed by islands extending from the western to the eastern shores, and through which there are only three channels for the influx and reflux of the tides, or for the escape of the waters of the Runn during the rainy season.

4.—The three channels are called the Nucktee, Khundla, and Hunstal, the first being on the western, and the last on the eastern, side of the Gulf, the Khundla being in the centre. Both the Khundla and Hunstal channels are used by the boats plying to the Jinjoora and Wowaneea bunders,—the depth of water in both being sufficient for the largest trading craft, and their width in most parts not less than a quarter of a mile. The name of the Hunstal channel is said by the native boatmen to have

been given owing to its being the resort and resting-place of large flocks of wild geese.

5.—It is confidently asserted by the boatmen, that formerly carts used to cross the Gulf from Rohur to the Katteewar side over these islands, and they state that the remains of cart tracks are still distinctly to be seen on some of the higher portions of the land. Only three creeks had to be crossed, and which they effected without the aid of boats at low water.

6.—I see no reason to doubt this assertion: it may be difficult, however, for some to reconcile it with the present depth of water (seventy-two feet) in two of the channels, though persons who have been stationed near such localities must be well aware of the extraordinary alterations and changes even a single tide or a small bush sometimes causes; and the account given by the boatmen of the increased size and depth of the Hunstal channel, affords another example, to the many already known, of the effects a small obstruction to the passage of water may give rise to.

7.—Formerly, when the land extended from shore to shore, and the channels were shallow, the fishermen were in the habit of making embankments for the purpose of catching fish. The water in the Gulf south of these islands is many feet lower than the water on the northern side near the entrance of the Hunstal, where they describe the fall as considerable, and similar to a water-fall. These embankments penned up the waters of the Runn until their increasing volume during the monsoon carried them away, and the velocity attained by the water owing to these circumstances, combined with the narrowness of the channels, are causes sufficient to account for the present deep channel.

8.—Many of the islands are covered with cher, mangrove, and peloo, bushes, but more particularly around their shores, which are constantly submerged by the tides, which appears necessary for the vigorous growth of the bush. On those parts of the islands where the sea water does not reach, the mangrove and peloo disappear, and sand occupies the place of mud and bushes. There are places, however, having these requisites, and yet neither the mangrove nor peloo will thrive: and this is particularly the case along the muddy coasts north of the Jinjoora and Wowaneea Bunders.

9.—These Islands, as far as I was able to examine them at low water-

are entirely composed of mud and sand, which I imagine are chiefly held together by the roots &c. of the mangrove and peloo bushes.

10.—North of these Islands the sea at this season of the year extends to the coast of Wagur and the Runn: it is generally shallow, and at a distance of two or three miles from the land there is seldom more than a foot or two of water, and often only as many inches; and during the months of November, December, January, and February, it is nearly or quite dry, and carts and camels cross without much difficulay, though owing to the prevalence of quicksand, called by the natives of Cutch veetroe, great caution and a good guide are necessary, as it is reported impossible to extricate any animal that may once have got into one. Many strange stories are told of carts, camels, and bullocks, having been swallowed up in these quicksands. At other seasons of the year small boats heavily laden carry on the trade across this portion of the Gulf, the bottom of which being very level and muddy, if the wind is fair, the boats glide over it with considerable velocity: the only difficulty appears steering the boats, but which the boatmen manage by the sail, as the rudder is useless.

11.—In crossing the Runn from Mallia in Katteewar to Sheekarpoor in Cutch, in the month of February 1848, I was particularly struck by these quicksands, which on the northern or Cutch side were frequent. The ground which these quicksands occupy is known, either from water appearing on the surface of the ground or from small patches of green grass. I examined a good many of them, and in each appeared a low stunted dead bush or a small rising patch of green grass, and around this the ground was so treacherous that any animal attempting to gain the grass would sink, or be extricated with difficulty and only by manual assistance. These spots were of no great size, and as far as I could judge from personal observation, were caused by springs of water rising through the strata beneath and causing the soil, which is a black sandy clay, to be so saturated as to become a quagmire.

12.—This opinion of the origin of these quicksands is founded on the fact of a very extensive one, with an overflowing spring, rising in the Runn south-west of Jinjoowara, and causing a swamp very similar to the quicksands I have described. This overflowing spring, the water of which though brackish is drinkable, issues from a square stone reservoir —built it is said in ancient days by the famous Sudrajee Jeysung, one of the kings of Anhulwarra. A rude stone causeway, formed of slabs of a

coarse conglomerate, leads from a large island to this reservoir, which at present is choked up with mud, being the accumulation of the ashes from the funeral pyres of departed Hindoos, which are thrown into this overflowing reservoir, from the want of some more sacred depositary like the Ganges and other sacred rivers. The outlet for the superfluous water is on the eastern side, and there is a constant stream issuing from it about six inches by eight; this causes, for a considerable distance round the reservoir, the ground to become a perfect swamp covered with green grass, upon which herds of buffaloes find pasturage—bullocks or cows do not venture on it. The appearance of this bright green spot in the middle of the Runn, where all around is bare and white, from the crust of salt which everywhere else covers this extraordinary locality, is most refreshing.

13.—On questioning some Meanas, a tribe of notorious plunderers residing on the borders of the Runn on either side, how they manage to escape these quicksands when the surface of the Runn was covered with water, they replied, that they could easily distinguish them even when the water was up to their saddle girths, both from the bearing of certain points of land and from an appearance on the surface of the water, doubtless caused by the flow of the spring being greater at that period, which must either discolour the water, or cause some peculiar eddy or movement in the water which experience has taught them to avoid.

14.—I observed the marks of cart wheels having apparently gone into some of the quicksands, and was doubting in my mind the truth of the stories about these spots being so dangerous, when the Meanas who accompanied me evidently conjectured my thoughts, for they at once explained that the marks were those of new cart wheels and carts that had been purposely placed in the mud for the purpose of seasoning the wood and rendering it more durable. They are allowed to remain from ten to fifteen days, or even longer.

15.—During a sail across from Wowaneea Bunder to Wagur Bara in the month of April, we disturbed three large sharks where the water was little more than a foot deep. I was informed by the fishermen they were numerous, and in such situations must fall an easy prey to the harpoon,—a weapon in use in those parts. Numbers of excellent eating fish are caught both by the hook and net,—the former an implement of most rude construction, being a bent piece of iron without pretension to shape or make; the latter an improvement on the common casting net, which it would be difficult to describe on paper, further than it will

catch a fish of any size it can cover, and that it is frequently thrown without the string being on the arm. I saw a very fine eating fish called the "chah" caught in this way: the phar is also another fine fish in high repute, and frequently caught in large numbers during the monsoon.

16.—On the eastern side of the Gulf, some distance inland, a ridge of sandhills extends from Jinjoora south, to Toonk north, clearly defining the ancient limits of the Gulf, but up to which, in the present day, the highest tides aided by the winds seldom reach.

17.—Having had no means except the eye and a compass to test the correctness of the chart, copy of which accompanies this paper, I would not assert it was free from errors, particularly as alterations must be constantly going on where the substance acted upon by strong tides and winds is of the nature described,—but on the whole, as far as I was able to judge, I consider the chart will be found, as regards the islands, creeks, and soundings, to be as true and correct as could be made without proper instruments or a regular survey, and certainly a vast improvement on our present imperfect maps.

18.—While sailing through the Hunstal channel, one of the boatmen mentioned that himself and some others, fifteen or twenty years before, were walking along the shore at low water when they discovered a quantity of bones, which they considered belonged to the human frame; one of which he described as the arm bone of a man from the ellow to the wrist, and measured seven hauths or about sixty-three inches in length; and on laughing at him about this, he stoutly asserted the fact, and that the bones of the ribs and knee-cap distinctly proved them to be parts of the human frame, and that they had carried some of the bones inland.

19.—It is probable these bones may have been the fossil remains of some large marine animal, as he described them as hard like stone. He also mentioned a boat having once been found near the same spot, over which some fifteen or eighteen feet of mud and sand had formed.

20.—During the prevalence of the westerly winds, and at ebb tides, a very heavy and rough sea arises near the southern entrance into the Hunstal channel, so much so that no boats can anchor there, and should they fail in getting inside, are obliged to run away for Jooria or other places.

21.—The leaves of the mangrove, called cher in this part of the country, are in great demand as food for cattle during bad seasons, when

hundreds are kept alive by feeding on them: boats sail to the different islands, and return filled with them—they remain good for four or five days. The fruit of the peloo is also in demand—it is eaten by the poor classes. A measure of fruit will always fetch an equal measure of grain: the seeds are used for making an oil called "Kakun," and a purple dye, it is said, is sometimes extracted from the fruit. These islands also yield a large supply of firewood and small rafters.

22.—I believe Lieutenant-Colonel Roberts has suggested that the dawk runners should cross these islands instead of the circuitous route near the head of the Gulf they now take. There is no doubt a considerable distance would thus be saved, and the only impediments that I could ascertain would be the necessity of keeping a small boat at each of the three creeks, and supplying those runners with water and provisions who had to remain on the islands. A boat is kept up for the dawk at the present time, where it crosses the Runn from Katteewar to Jhingee.

June, 1848. G. FULLJAMES.

N. B.—Two Charts are fowarded—one a copy and translation from the original, the other a reduced one. G. F.

ART. XIV.—*A Narrative of a Voyage in search of the Crew of the Ship "Charles Eaton," performed in the year* 1836. By Commander G. B. KEMPTHORNE, I. N. [Continued from page 236.]

[Communicated by the Author.]

AT 6·15 the following morning weighed and made all plain sail, steering W. S. W., moderate trade with fine cool weather, thermometer 74°. At 7, passed an extensive sandbank just above water, stretching to the S. W. about six or eight miles, Halfway Island bearing W. by N., distant one mile, in fifteen fathoms sandy bottom. At half-past ten saw Mount Adolphus from the deck bearing S. 40° W., and also another detached sandbank to the W. S. W. At noon, our latitude by meridian altitude was 10° 31′ S., Double Island in sight bearing N. 65° W., the centre Isle of the York Group S. 60° W., and Cape York S. 50° W. Standing close in towards Mount Adolphus, distance off shore about three miles, our soundings from Halfway Island to this place were very regular, decreasing gradually from seventeen fathoms to eleven. The navigation had now become more open and free from dangers,—the limits of the coral region had in fact been fairly passed, and we were no longer thread-

ing our tortuous course through a maze of rocks and shoals, but were quietly wending one way over the smooth and placid waters towards our next anchoring ground. A few scattered sandbanks only were seen during the day, but these are easily avoided by attention to the lead, for the soundings gradually decrease as they are approached. The sea having lost its bright blue colour, had now assumed a muddy appearance : no distinct outline of these dangers could therefore be clearly defined. I would consequently strongly recommend after having passed Halfway Island, that the lead should be kept going, for the neglect of this simple but necessary precaution might endanger the safety of a ship and crew.

These islands, called by Captain Cook the York Group, are situated in latitude 10° 28′ S. and longitude 142° 45′ E., and are all moderately high and of some considerable extent, but rather destitute of trees and shrubs, which gives them a bare and barren aspect. After skirting Mount Adolphus rather closely, and observing it was uninhabited, bore away W. N. W. for Double Island, and soon after perceived a Schooner at anchor under its lee. The soundings still continued very regular, carrying from thirteen to nine and a half fathoms from the York Group until we came to in that depth of water off the western end of Douhle Island, about a quarter of a mile from the shore, centre of the island bearing S. 50° E. Moderate breeze with fine cool weather; thermometer in the shade 74°; strong ebb tide setting to the westward. The vessel proved to be the Colonial Schooner *Isabella,* sent by the Sydney Government on the same errand as ourselves. Capt. Igglesden and a party of officers went on board to obtain all particulars regarding their proceedings in search of the crew of the *Charles Eaton.* Having given the heads of the conversation that then took place, in a former portion of this narrative, it is therefore unnecessary to allude to it again ; and willingly do I drop the veil over this mournful and frightful tragedy, the very thoughts of which make the blood run cold.

On the following day visited the shore for the purpose of examining the island. Found in the beach as we landed several very beautiful specimens of dead coral, chiefly madrepores and tubipora musica : this latter species was of a red colour, and consisted of small tubes arranged vertically, and in regular order, with a thin plate horizontally placed between each row about an inch or so apart, and not unlike the pipes of a common barrel organ. Several kinds of sponges also were picked up, which were observed growing on the rocks beneath the surface of the water. The formation of one genus was very singular, being in the shape of a

cone, and about the size of a large tumbler, having a short stem with a flat bottom: it was hollow within, and the sides, when distended with water, were about a quarter of an inch thick. From its almost perfect resemblance to a tankard, it has received the very appropriate name of Neptune's Goblet: several specimens we collected would have held full a gallon of water. Shells were not very numerous, and the only ones we picked up were a few small conches and some cowries. Double Island is uninhabited, and consists of two portions connected only at low water by a narrow isthmus: the southernmost is very low, not much above the level of the ocean: it is very well wooded, the trees chiefly consisting of the spiral pandanus palm, a species of acacia, and the bamboo. The soil is a deep vegetable mould formed over a bed of coral rock. In the centre was a fine open spot of some four or five acres in extent, covered with fine long grass, the ground appearing as if it had been once cleared and cultivated. The easternmost island is about six or seven miles in circumference, and between 300 and 400 feet high: it is rugged and very steep, and the sides of the hills are strewed with large boulders: it is purely a granitic formation, though at the base near the sea we observed a bed of carboniferous limestone protruding beneath, having a considerable dip; it was therefore evident that the solid masses of the primary rock had burst asunder the upper crust by some extraordinary convulsion of nature, and now had taken the place of the secondary series. A few stunted trees grew about the sides of the hills, and some high coarse grass in the gullies and crevices, but there was little soil to support much vegetation, the greater portion having long since been washed away by the heavy rains. We found adhering firmly to the rocks, a very beautiful species of fern, called the oak-leaf polypodium: the root, which was quite exposed, was from six to ten inches in length, and two or three in circumference, thickly coated with a silky down of a nut brown colour. Four or five leaves extend along the upper edge of the root, and exactly resembled, both in size and shape, the dead leaf of our English oak, but rather larger. The stem sprung from the centre, and grew to the height of about three or four feet, covered with those light green drooping feathery leaflets so characteristic of the common fern. A specimen I brought away with me lived for many months, and actually sprouted, but owing either to the sea air, or want of proper attention, this curious plant at last withered and died. At sunset returned on board much pleased with our day's excursion, but before quitting the shore, the sailors, by way of amusement, set fire to the bush, and in the space of a short time, the whole of the eastern island was in a blaze, the

flames running with the rapidity of lightning along the whole top and sides of this granite rock, casting a lurid glare on the calm and unruffled waters, and illuminating all the surrounding objects with the brightness of day. It was certainly a grand sight, and I continued gazing on the burning island until near midnight, when the flames flickered away, and at last became extinct. During the day immense numbers of sharks surrounded the vessel: several were taken and many shot—in fact they were so numerous that the crew actually were tired of killing them. The ebb tide we found set strong to the westward, being also much more regular in its course than when amongst the coral reefs. The next morning at sunrise weighed anchor in company with the *Isabella*, and steered W. S. W. At 6·40, a small rocky islet, a few feet above water, was discovered from the deck: it bore N. 40° W., and was distant about five miles. In consequence of its not having been laid down in our chart of these seas, the Captain named it Grant's Island, after the Governor of Bombay Sir R. Grant. As we neared Wednesday Island, saw several natives on the beach making the customary salutation, by waving palm branches. At 10 anchored off the N. E. end of the island in seven fathoms sand, about $\frac{3}{4}$ of a mile off shore, extremes E. by S. $\frac{3}{4}$ S. to S. W. $\frac{1}{2}$ S. Captain Igglesden, and a party of us, landed shortly after anchoring, with the hopes of having an interview with the natives who were then lining the beach, but as soon as the boat touched the shore they set up one terrific yell, and fled precipitately into the woods. As we approached them, making all kinds of friendly signs, we plainly saw these savages peeping behind the trees and retreating as our party advanced. Finding that we should never come to a good understanding with these creatures, we laid down our arms and beckoned them to stop. Three, after eyeing us suspiciously for some time, made a dead halt, and after various antics, at last came forward grinning most ferociously, and talking very loud and fast, evidently showing by their manner some degree of fear. They frequently called our attention to the guns, and from their signs, gave us clearly to understand that they were perfectly aware of their use and dreaded their effects. We distributed a few trifling presents amongst them, but they did not seem pleased; nor could we manage to establish the same degree of confidence with them as we did with the friendly Murray Islanders. They were evidently suspicious and mistrustful, and their countenances clearly indicated that ferociousness and treachery lurked beneath. They resembled the Murray Islanders, though far more wild and savage-looking: the generality were however tall but ill shaped, their arms and legs being

thin and lanky, whilst the abdomen was unusually large and distended. They were perfectly naked, and wore no ornament except a necklace of beads or shells. A few amongst them had their bodies cicatrized: nearly all had the lobes of the ears and septum of the nose perforated: their heads were as usual decorated with feathers, and many had them plastered over with chunam. They were particularly stupid, and completely destitute of that intelligence which was so characteristic of the inhabitants of Murray's Island. The language was apparently the same, but they talked so fast that we could scarcely distinguish a single word they uttered. They repeatedly pointed to the ships, and by their gestures seemed anxious we should leave them, which we did after a very brief interview, not at all regretting our parting from such a barbarous uncivilized race. As we quitted, a pistol was discharged in the air by one of the men, and the moment they heard the report, many from terror fell flat on the ground, with their hands pressed tightly to the ears to keep out the noise; whilst others hid themselves in the jungle. They all soon hurried away, and never again molested us with their presence. They were all armed with bows, arrows, spears, and clubs, but as none of these war implements were used during our visit, we therefore lost an opportunity of witnessing their skill and mode of handling them. When the bow is required, a guard made of basket-work is worn over the left arm just above the wrist, to prevent the string or arrows from injuring it. Their clubs were made of some sort of heavy wood, and were very rudely carved with barbarous designs. Their village, which was situated on a low sandy point on the south-western extreme of the island, consisted of a few miserable huts, and I should imagine did not contain more than 200 inhabitants. They had also some large canoes, which were hauled up on the beach, and none of them were ever launched whilst we remained at the island. The women appeared to have separated entirely from the men, for on our coming to an anchor a group of about twenty of them were seen on the beach immediately opposite the vessels, formed into a circle, and were dancing round and round with savage wildness, at the same time clapping their hands and making the most ridiculous antics possible; whilst they vociferated, or rather screamed, so loudly that we could distinctly hear them on board. They wore the same grass petticoat as the females of Murray's Island, and like them were naked from the waist upwards. They appeared to be greatly alarmed at our presence, —whether from a sense of innate modesty or otherwise, we were at a loss to conceive; but directly the boat touched the shore, they scampered away as fast as their legs could carry them, and during our visit we were never again favored by a sight of these sable damsels.

Whilst amusing ourselves by wandering about the island, we observed numbers of ant hills of gigantic size, many being twelve or fifteen feet high, and full twenty in circumference at the base. They were conically shaped, and were formed of clay or mud baked hard by the heat of the sun's rays. No opening into these surprising structures could be perceived, but on knocking over the tops of some, innumerable passages and cells were discovered within, all filled with myriads of small ants. Delicious looking fruit, about the size and appearance of a ripe mango, were also seen hanging most temptingly from the boughs of several trees: one I ascended for the purpose of gratifying my taste, but no sooner had I stretched out my hand to gather this apparently luscious fruit, than in one moment it swarmed with a greenish-coloured insect—it was in fact an ant's nest I had mistaken for fruit: my astonishment, therefore, as may be imagined, was fully as great as my disappointment. The ants were fully avenged for being so unceremoniously disturbed, as I was so fearfully stung by them that I was glad to make a hasty retreat. The nests were curiously constructed of the leaves of the trees, the sides and ends being fastened together by some glutinous secretion which nature had furnished this tiny insect. They were all shaped like a small oblong box, and at a small distance off could not in reality be distinguished from a mango or guava, so that even a wiser head than mine might have been deceived. —Wednesday Island is situated in latitude 10° 27′ S. and longitude 144° 22′ E.: it is well wooded, and is about thirty miles in circumference. Some open spots were seen here and there clothed with high grass, the ground in many places being deeply furrowed, and the trenches lie so evenly and regularly from east to west that it seems as if the ploughshare had once gone over it, but this could never have happened, so I conclude that nature alone must have formed the furrows. A plain from the sea beach extends inland to some distance, and is covered with trees. At the back of this rises hills of moderate height in the form of an amphitheatre, the two extremes verging towards the sea: they are all of granitic origin, and are the grey kind resembling the Cornish or Scotch. On closely examining those rocks where the bare sides were exposed, I perceived that several parts exhibited a blueish-green appearance, as if tinged with the oxide of copper; nor should I be surprised if veins of that ore may at a future period be discovered, as it is well known that some of the richest mines of Cornwall have been worked on the actual confines of the granite and porphyritic series, and several of the loads in fact have run deep into the very heart of those rocks, though hard and difficult to excavate, yet it has been accomplished with considerable profit

to the adventurers. Beautiful flowering shrubs and creepers were also very plentiful. Doves and pigeons, and a variety of other birds of the gayest plumage, flitted from tree to tree, but no quadrupeds of any sort were seen: the savages even were not possessed of a dog. After wandering about the shore nearly the whole day, collecting curiosities and botanical specimens, returned on board the *Tigris* at sunset. The anchorage off this island is excellent, being quite sheltered from the south-east trade; the land is formed into a small bay about five or six miles across from point to point, and about two deep, the water gradually shoaling towards the beach, which is composed of a beautiful white sand. There is good landing for boats in any part, and firewood might be obtained in any quantity; but whether water could be procured, was very doubtful, as we saw neither springs or wells; but I should imagine, from the fact of the natives residing on this island, that that essential and indispensable element could be found by digging. An extensive sandbank, with only three or four feet water on it, was seen from our anchorage, a quarter of a mile distant, and bore southwest: this danger should be avoided by giving it a wide berth on entering or leaving, as it stretches off the shore some considerable way. There will be no difficulty in doing this, as the shoal can be easily distinguished by the eye. The next morning, the 3rd of August, weighed and made all sail in company with the Schooner *Isabella*. Moderate breeze, with fine clear weather. Thermometer 73° at sunrise. At 8 A. M. passed a ledge of rocks, distant about a quarter of a mile, bearing S. 5° W., standing close in towards Hammond's Isle. This group of small islets is situated a few miles to the westward of Wednesday Island, and all are of moderate elevation: they have quite a picturesque and beautiful appearance from the sea, being pleasingly diversified by gently undulating hills, vallies and plains, interspersed with trees and shrubs of varied foliage; whilst here and there were seen lawn-like spots of the brightest verdure, having a strong resemblance to a gentleman's park in England. The scene was altogether so perfect, that a person whilst gazing on these islands might almost picture to himself some noble mansion, or a sequestered village with its ivy-clad church, just peering above the trees, or standing out in bold relief on some gently sloping eminence; but our hopes of seeing such civilized habitations were of course doomed to disappointment,—not an abode of any kind could be perceived, not even the huts of the savage: Man, it was evident, had abandoned these lovely shores, and Nature alone was left to revel and vegetate in all its tropical luxuriance, without a human being either to gather in or preserve the sponta-

neous and indigenous productions of such a prolific soil. I feel assured that if these fertile Islands were colonized, they would speedily be converted into a beautiful garden, "and smiling plenty would soon cheer the labouring swain." Nutmegs, and many valuable spice trees, from the neighbouring Island of New Guinea, might also be introduced, and I have no doubt they would answer every expectation, as the soil and climate is very similar, being situated in nearly the same parallel of latitude and about the same meridian of longitude: the heat is never very great, as the sky is generally overcast with a thin stratum of clouds, and moreover it is tempered during the greater part of the year by the cool and refreshing breezes of the south-east trade. Showers almost daily falling, cause these Islands to appear in a state of perpetual verdure: the rainy season I believe occurs in January and February, when the wind shifts round to the north-westward and north-eastward. During the period we were in Torres' Straits, I kept a register of the thermometer, and found it varied from 71° to 83°, the highest and lowest point, but the mean average of several observations gave only 76°. The nights were delightfully cool, and the days, even when the sun was out, were far from oppressive—in fact, we found no inconvenience whatever from exposure. The whole group of Islands from Cape York to Hammond's Isle, from what we observed of their character, are admirably adapted for the European constitution; and if they were occupied by a few hardy and speculative adventurers, they would, I have no doubt, in process of time become a vast emporium for the traffic of this part of the world. The ultimate benefits derived from founding such a colony in the very centre of a dangerous sea, (which has now been made the high road to India from the Southern Pacific Ocean) must be incalculable, for it would not only open out a new trade now lying dormant, but it would moreover afford safe shelter to any shipwrecked crew, or relieve vessels in distress; and great must be the amount of lives and property thus saved. A second repetition of the *Charles Eaton* massacre would also be effectually prevented. An extended intercourse with these savages, should such ever take place, must also change their ferocious habits, and instead of bloodshed and plunder, they would follow less horrible pursuits, rising in the scale of civilization, and taking their stand amidst the more favored nations of the earth. If some of these Islands were settled, what immense riches might not that splendid and magnificent Island of New Guinea supply to the world? She still remains, as she has for ages past, an unknown and mysterious land—the Ultima Thule of modern times: her treasures lie hid in the deep recesses of her vast forests; her plains

and vallies, of the wildest luxuriance, watered by innumerable rivers and streams, are untouched by the hands of man; and although her woods teem with birds of the most gorgeous plumage, the land alone is inhabited by the naked and barbarous savage, who lives on the indigenous productions of the soil, and delights only in brutal wars and rapine: it is in fact a paradise, peopled by the most inhuman race on the face of the earth. England should therefore claim this magnificent country, and be the first in the field to make known to the world its value and its resources: it would be adding another bright gem to Victoria's diadem. Shortly after we had passed Hammond's Isle, sighted Booby Island bearing S. 22° W., distance six leagues. On approaching it, observed a staff erected in the centre, on which was a white flag flying. At 10·40 A. M., hove to under the lee in seven fathoms, a quarter of a mile off shore. The gig was lowered, and I was dispatched to ascertain what the signal meant. On landing, had to scramble up the steep sides of the rock, and when I reached the top, found that a bottle only was attached to the pole, which contained several letters from the Masters of the different merchant ships, merely announcing their safe passage through the intricate and much-dreaded navigation of Torres' Straits, and requesting to be reported at the first port touched at. A short notice of the *Tigris's* and *Isabella's* voyage was also added to the contents of the bottle, and it was afterwards safely deposited in its former place. I then returned on board and reported my proceedings to the Captain, telling him at the same time the names of the vessels that had recently passed. This Island is in latitude 10° 36′ south and longitude 141° 53′ east, and is a mere barren rock, only about a mile or so in circumference, and not more than 50 or 60 feet high: it is perfectly destitute of everything like vegetation except a few prickly shrubs. The place literally swarms with boobies, and the stench from the ammonia caused by their deposits was most sickening, so that I was glad to hurry off the Island as quick as possible. On the very summit discovered a large bar of iron standing in a small well some four or five feet deep, containing a spring of tolerably good water: the bar I concluded was placed in the well so as to mark the spot. At 11·40 hoisted up the gig, made all plain sail and stood to the westward: latitude at noon 10° 36′ south, Booby Island east by north, distant six miles. At 1·30 bore away to avoid a shallow patch, two more appearing to the southward at the distance of a mile and a half: hauled up immediately and steered to windward of them—least water in passing, seven and a half fathoms. The sea was very much discoloured, and of a muddy appearance: these patches appeared to be about a half mile in length, and

fathoms close round the vessel,—she having grounded on a small patch of coral rocks not much larger than the *Tigris* herself. About 9 P. M., the flood tide, fortunately for us, made, and rose so rapidly that in a few minutes we had 2¼ fathoms immediately under the fore chains. It being now apparent that she hung only abaft, the quarterdeck guns were run forward, and all sail being rapidly set, the vessel, we were glad to find, began to grind slowly over the rocks ; and in the space of half an hour, after several heavy bumps, succeeded in forcing her clear off, and then came to an anchor about one mile from the shoal in nine fathoms. The well being sounded, it was found that the brig had sprung no leak, the carpenter reporting she had not made even a drop of water : had the *Tigris* therefore not been teak built, in all probability she would have gone to pieces, for no other vessel in the world could have stood such tremendous shocks as she did for a period of three hours. She had, however, as we afterwards ascertained, suffered considerable damage : her fore-foot was gone, and the whole of the false and upwards of twenty feet of the main keel had been torn away, leaving the copper bolts sticking outside, bent and twisted in every direction. This reef was not laid down in any of the charts we had on board, and even in the recent ones constructed by Captain King it was left out altogether, so that we were quite unprepared for so serious an accident. It was, moreover, to be regretted that Captain Igglesden did not fix the correct position of this dangerous reef, but he only refrained from doing so in consequence of the loss of our rudder, and being most anxious to get into Raffles' Bay as quick as possible, where he intended to repair damages. This patch of rocks, as far as I could observe, was situated about four miles to the north of Cape Croker, with deep water between it and the mainland. The lead is a good guide, for the soundings shoal gradually as it is approached : no vessel in rounding this Cape at night ought therefore to come under nine fathoms. We experienced a fresh trade with a heavy swell, the ebb setting to the south-eastward three knots per hour.

The next morning weighed and made all sail in company with the Schooner, and stood into Raffles' Bay, steering the vessel alone by the assistance of her head and after sails : found that she worked admirably by this management, and at 2·15 P. M. we contrived to bring her safely to anchor in three and a half fathoms blue clay, about half a mile off shore, and a mile from the old settlement ; the two extreme points of the bay bearing from north 38° west to north 40° east ; a small woody Island distant half a mile south 4° west. This port is of very easy ac-

and is quite free of all danger, the soundings being even and regular, the holding ground excellent,—the bottom stiff blue clay: the anchorage is also well sheltered from the south-east trade, though it is open to the northwest and northeast winds, but during the season when it blows from those quarters a vessel might shift her berth under the lee of one of the neighbouring islands. The land about Raffles' Bay is very low, but densely wooded, the forest extending inland as far as the eye could reach. Saw several large columns of smoke ascending from amidst the trees, which we supposed were the signal-fires of the natives warning each other of our approach, as nothing of the kind was observed until we were close in shore. Shortly after we came to an anchor, seven natives were perceived walking steadily along the beach carrying a blazing torch in their hands, now and then halting for the purpose of setting the bush on fire. As soon as they got abreast of the vessels, they squatted down on the rocks and kept gazing attentively at us, but, unlike the natives of Murray's and Wednesday Isle, they waved no palm branches or made other friendly signs for us to land. A gig, however, was dispatched to the shore, in the hopes of obtaining an amicable interview with the natives, which was effected, and three very readily came off to the *Tigris*. They were all quite naked, and each carried a spear, and a small basket neatly made of a peculiar kind of palm leaf, which contained some bulbous and fern roots, supposed to be their food. They had all lost two front teeth, and their bodies were horridly scarred: two had several streaks of white chalk drawn across the breast and forehead. They were the most miserable looking savages we had as yet seen—infinitely inferior to those of Wednesday Island: in fact, they appeared but one degree removed from the brute creation. Their hair was thick and bushy, and hung in stiff matted locks over their shoulders: the cheek bones were high, the eyes deeply sunk in their sockets, forehead unusually low, and their legs thin and lanky, exhibiting so great a want of muscular power that those limbs seemed incapable of supporting the body. They wore no sort of ornament, and only felt proud of the innumerable welts or cicatrixes with which their persons were covered. Their features and their appearance altogether was most revolting, and yet, at the same time, excited a degree of pity, for the poor wretches seemed to be in a state of starvation, their ribs actually protruding through the skin, and they made such frequent signs of hunger that we gave them as much boiled rice and biscuit as they could eat, and the ravenous manner in which they devoured the food fully proved the fact. One of these natives called himself Wellington, and another Waterloo,—two names which I suppose

must have been given them by the former settlers: they pronounced the words very distinctly, and were quite proud to be so called.

The next day the carpenter with a party of hands were sent on shore to select some trees in order to construct a new rudder, and although a large number were cut down, only two were found fit for the purpose required,—the remainder being perfectly hollow inside, the very heart having been eaten through by those destructive insects the white ants. The timber, to all outward appearance, was perfectly sound, and it was only when felled that its inutility was discovered. The trees were a species of iron gum, which abounds throughout this extensive forest. The wood is of a dark mahogany colour, very hard and exceedingly difficult to cut; but I should imagine it would be found most durable, and capable of taking a very high polish. During our stay in this harbour we made frequent excursions to the shore, and were seldom molested by the natives: though we roamed about the whole day, shooting and collecting curiosities, never more than twenty appeared at one time together, and when this number did come, they remained only a short time: we saw none of their women, neither could we discover where they were concealed. Not a vestige of a hut or habitation of any kind was seen, and from this circumstance I should imagine they lived, as that quaint old navigator Dampier describes them, entirely in the open air, covering themselves up at night in the barks of trees, and sleeping like beasts of the field on the cold damp ground. They have no sort of cultivation, and their only food are shell-fish and a species of fern root. The latter is pounded between two stones until it becomes a soft pulp, which is then eaten, and this they are constantly chewing the whole day as an ox would its cud. Some of their baskets (which were invariably slung round the back of their neck) were made of grass very ingeniously plaited, and of an oblong shape, about a foot long and five inches in diameter. The baskets, as well as the ones before described, usually contained their food. These savages were all similar in appearance to those that visited the vessel the previous evening, and the whole were minus two teeth in the upper jaw. Several we particularly noticed were not only fearfully cicatrised, but they had also white and red ochre bands or stripes painted on various parts of the body. This is supposed by many writers to be a sign of mourning for a friend or relation. They carried spears about five or six feet long, made of a hollow reed pointed with hard wood, many being barbed and notched deeply, so that if these entered the flesh they could with difficulty be extracted. A few only were possessed of the farfamed Australian instrument called the bomerang, which they used most dex-

terously, striking objects with the greatest accuracy at the distance of seventy or eighty yards. They had no bows or arrows, nor were they acquainted with these warlike weapons: they however seemed to understand the utility of our guns, for whenever they saw a bird they invariably made signs for us to shoot it, and if the bird was killed there was a pellmell rush, and immediately it was secured the fortunate possessor would skulk away from his companions in some retired corner in order better to enjoy his sumptuous repast. They were not at all particular as to the species of bird we gave them,—a huge grey-headed old vulture or brahmini kite being as equally relished as the more delicate dove or paroquet: they were all alike devoured with the greatest voracity, a few minutes being sufficient to finish even the largest bird. They eat them quite raw: the only cooking found necessary was merely singing the feathers partially off by holding them over a fire for a short time,—entrails and feathers being swallowed with as much goût as if it had been the greatest dainty. It certainly was a most revolting sight to witness these miserable half famished creatures devouring a vulture with ravenous appetite. They looked the very picture of savage ferocity as they tore it in pieces with their hands, and gnawed the flesh from the bones with their teeth like a pack of hungry wolves, growling even if any one approached them, fearing I suppose they would be robbed of their delicious morsel. Whilst thus employed they resembled fiends more than human beings, and had we not seen these savages, we should never have believed that any class of people could ever have been so low in the scale of civilization:—they appeared only one link removed from the man and the ape: their language also seemed to be a mere chatter—we could not make out a word they said. We found them, however, tolerably friendly, and only once during our visit was our amicable intercourse interrupted: the following was the occurrence. A boat's crew, whilst on shore, the day previous to our sailing, washing their clothes, had spread some of their things out to dry, when a party of natives suddenly emerged from the trees and made a rush to steal them, but were prevented from doing so by the men firing their muskets over their heads: this caused them to retreat, and as they ran off they threw some spears at our people, but fortunately they fell harmless amongst them. Thus ended our last interview with the savages of New Holland, none of them ever appearing near us afterwards,—dreading no doubt that we should inflict upon them a severe chastisement for their treacherous conduct!! The trees chiefly consisted of the acacia and eucalyptus: from many of the latter a considerable quantity of a reddish colored gum exuded, yielding a slightly aromatic perfume, and resembling

in appearance the sanguis draconis of Socotra. The bark of one of the former species was white and friable, and intensely bitter to the taste. The generality of the trees were high and straight, the branches however only extending a short way down the trunk. The ground was almost destitute of underwood and grass,—a few stunted bushes appearing here and there. Some of these shrubs were exceedingly pretty, and one in particular had beautiful lilac-coloured flowers hanging in clusters from the stem, and was very like our English heath: the shores round the whole bay were fringed with a dense jungle of mangroves, which grew close to the water's edge but stretched no distance inland. The soil was composed of a lightish-coloured vegetable mould, and the rocks on the sea shore were all of a highly feruginous nature. Some of the pebbles picked up were exceedingly heavy, and when broken had a metallic lustre: many of the stones, and the rocks even, seemed to have been much blistered as if by the action of fire, thus leading me to suppose that this portion of New Holland must have been upheaved by some vast subterranean explosion; and though neither scoriæ or lava could be found to prove my hypothesis, yet there was abundant evidence in the specimens we obtained, of their having once been subjected to an intense heat; but whether owing to volcanic origin or otherwise, I am not able to determine,—I must therefore leave it to the modern geologist to solve this problem. Birds of all kinds are very numerous, especially the paroquet and cockatoo tribe. The former were noted for their great variety and brilliancy of plumage, and were far more beautiful than any we had as yet seen,—the latter being principally white, with orange-coloured crests: a few black ones were also observed occasionally, but they were shy and very scarce. Not a quadruped, or any sort of animal, was seen during our frequent excursions to the shore, but the natives made signs that there were kangaroos in the interior. The old settlement was situated on the eastern side of the Bay. A great portion of the ground around it had been cleared, but not a vestige of a fruit tree or vegetable (which the colonists had planted) remained; the natives had in fact burnt up and destroyed everything as soon as this ill-fated and ill-chosen colony was abandoned, three or four wells, containing an indifferent supply of water, only indicating that this place had once been the abode of civilized man. Havoc and ruthless devastation by the hand of the barbarous savage had swept away all traces of cultivation, and a mass of charred wood, and a few heaps of blackened ruins, alone served to mark the spot.

Croker's Island, which is situated about six miles further to the eastward of Raffles' Bay, is conspicuous for its high precipitous cliffs of red

sandstone, deriving its tinge no doubt from the oxide of iron. It is long and narrow, and separated from the mainland only by a small strait two miles or so across: fine open plains, with glade-like spots covered with high grass, and dotted here and there with clumps of trees of dwarfish growth, was the characteristic scenery of this island. The soil is a darkish-coloured loam, and has the appearance of being of an extremely fertilizing quality, and no doubt if the ground was cultivated, it would produce tropical fruits and vegetation to any amount. I am astonished the settlers did not locate themselves on this Island instead of Raffles' Bay, for it seems, from a variety of circumstances, far better adapted for a colony than the latter place, the land being quite clear and almost destitute of timber. The pure sea breeze is consequently not obstructed, and the climate must be for that reason rendered cool and pleasant,—whereas in the old settlement, situated as it was on the immediate skirts of a thick and almost impenetrable forest, the contrary effect would be produced, for the south-east trade, blowing as it does immediately over the land, would become not only heated, but it would bring with it noxious gases arising from decomposed vegetable matter, which must be injurious to human life. We made several trips to this island, and had therefore an opportunity of judging of the difference between the temperature of the one and the temperature of the other; and it was certainly very remarkable that on the island we enjoyed the cool and invigorating breeze, and could walk about in the sun the whole day without any ill effects, whilst in the latter, although the sun's rays were almost shut out by the dense foliage over head, yet we felt fatigued and languid even ofter an hour or two's excursion, from the oppressive heat caused by the want of a free circulation of air. Croker's Island being quite uninhabited, would for this reason also have been far preferable as a colony, for the natives could never have annoyed or molested the settlers in any way: they are not possessed of any canoes, and the only means they have of crossing the small straits which divide it from the mainland are rough logs of wood rudely lashed together by cords constructed of grass: this circumstance thus effectually deterring them from making any hostile attack. The only two savages we saw on the island were our sable friends Wellington and Waterloo, who often paddled across the water for the purpose of accompanying us. They were our constant companions, and wherever a party happened to be, they were sure to find it out, no matter at what distance off. They were always very friendly, and their presence was usually greeted by us with acclamations of pleasure, which they received by shouting out their English names at the very top of their voices. They were not timid, like the rest of their tribe, when in our society, but quite the contrary, for they seemed never to be more pleased than when with any of our party. I suppose from this circum-

stance they must have been a good deal with the settlers from the time the colony was founded until it was abandoned. They also knew a few English words, such as water, fire, &c. Birds of various kinds were plentiful, but chiefly of the plover and lark species: curlews and some wild duck were however killed in a small lagoon near the beach on the eastern side,—and also a few snipe, but the latter were far from numerous. At the back of Croker's Island good anchorage may be obtained, sheltered from all winds, and I should imagine was available at any season of the year.

Raffles' Bay is situated in latitude 11° 07′ south, longitude 132° 27′ east, and is about six miles long and two or three wide, with an uniform depth of water of three and four fathoms throughout. Boats can land on any part of the beach without any fear of being injured, as the sea is perfectly smooth and there is no surf. Water, though never very abundant, can however be procured with ease and sufficient for the supply of two or three vessels; and it is sweet and good. The wells are close to the shore, so that the casks only have to be rolled a short distance: there is also a small chain of ponds at the bottom of the Bay, where water is also to be had, though not quite equal to that of the wells. Wood is of course to be obtained in any quantity. Fish are very plentiful in the Bay, of excellent flavour: the rock cod caught near Croker's Island, and a species of roe ball, were much relished. Muscles and other shell fish, together with the trepang or beche de mer, were found to be abundant near the shore. The Malays no doubt frequent this Bay for the purpose of collecting and curing the latter for the Chinese market. We saw no turtle during our visit, nor should I imagine it to be a place of resort for this amphibious animal, as we perceived no very extensive sandy beaches where they could deposit their eggs.

On the morning of the 17th, having finished our temporary rudder, and repaired other damages, weighed in company with the *Isabella*, and stood out of Raffles' Bay, shaping our course for the Island of Timor, experiencing nothing but light baffling winds from south-east to north-east until the 24th, when the weather became squally with a short confused sea running. At 10 A. M. saw the high land of Timor through the haze bearing north 30° west. At noon our latitude per meridian altitude was found to be 10° 17′ south and longitude 124° 12′ east,—the Island of Rotto in sight from the deck, bearing south 70° west. At 4·30 P. M. passing through the Straits of Samao, standing close in to the Island of Timor. The breeze now becoming light and variable, the vessels made but little progress in consequence: it however afforded us a very excellent opportunity of observing the appearance of the land, which was certainly picturesque in the extreme: hills rising on hills in gradual slopes, thickly clothed with wood, and in many parts fine verdant spots of some considerable extent could be distinguished in a state of cultivation: several large villages were also scattered along the beach—a proof that the place was very populous. The opposite Island of Samao, from whence the Straits derives its name, is much smaller than Timor, and not so lofty or mountainous; but it seems